Universidade de Aveiro Departamento de Economia, Gestão e Engenharia Industrial
2012

NEDA TORABI FARSANI

O TURISMO SUSTENTÁVEL NOS GEOPARQUES ATRAVÉS DO GEOTURISMO E DO TRABALHO EM REDE

SUSTAINABLE TOURISM IN GEOPARKS THROUGH GEOTOURISM AND NETWORKING

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tese apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Doutor em Turismo, realizada sob a orientação científica da Professora Doutora Celeste Coelho, Professora catedrático do Departamento de Ambiente e Ordenamento da Universidade de Aveiro, e Co-orientação científica do Professor Doutor Carlos Costa Associado com Agregação do Departamento de Economia, Gestão e Engenharia Industrial da Universidade de Aveiro

Apoio financeiro da FCT e do FSE no âmbito do III Quadro Comunitário de Apoio.

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

I dedicate this thesis to Rasool, my parents, my brother and sister and my baby who is coming soon for their support, love and encouragement.

o júri

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acknowledgments

Firstly, my appreciation goes to FCT (Fundação para a Ciência e a Tecnologia) for supporting this thesis.
In addition, I owe gratitude to many people for their support and encouragement as I have been completing this PhD thesis.

First of all, I would like to thank my advisors, Professor Celeste Coelho and Professor Carlos Costa, who have provided me with this wonderful opportunity to study at the University of Aveiro and I appreciate their help and guidance in this way. It has been a great pleasure working with them!

Thanks to the juries who kindly accepted to review my thesis!

Secondly, many thanks go to my husband for sharing all those days with me surveying the local communities of Qeshm and others geoparks. I love you Rasool!

Particular thanks go to my kind parents for always supporting my crazy pursuits with their prayers, finances, encouragement and time. I love you both!

Reza and Negar thanks for your kinds.

I am thankful for all my friends (Fillipa, Joana, Susana, Zelia, Marília, etc.)!

This geotourism study could not have been implemented without the help of Margarete Patzak – the Programme Specialist from Global Earth Observation Section, Division of Ecological and Earth Sciences UNESCO – special thanks for her contribution in collecting questionnaires. I also appreciate the help of managers and officials of the Global Geoparks Network for providing the requested information.

Next I would like to thank Carlos Neto de Carvalho and Joana Rodrigues (officials of Naturtejo Geopark), who opened my vision about geopark activities.

I also want to thank Qeshm Geopark authorities and I am truly grateful for their help.

Finally, thank you to everyone who helped me on the way, including those that I may have forgotten to mention here.

palavras-chave Geoparque, Geoturismo, Inovação, Rede, Desenvolvimento Rural, Sustentabilidade

resumo

Esta tese analisa o papel desempenhado pelos geoparques e pelo geoturismo para a sustentabilidade socio-económica e sociocultural das áreas rurais e de que forma estes contribuem para o turismo sustentável. Para esse efeito, o estudo é baseado numa extensa revisão da literatura sobre geoparques, geoturismo e turismo sustentável, bem como a atividade em rede e inovação aplicada aos geoparques registados na Rede Global de Geoparques.

Com base na revisão da literatura, uma série de hipóteses são formuladas para serem depois testadas na parte empírica da tese. A população estudada constou dos geoparques registados na Rede Global de Geoparques (N = 64), em 2009, a nível internacional. O primeiro questionário investigou o papel dos geoparques no desenvolvimento rural e O segundo questionário analisou a atividade em rede entre geoparques e avaliar a taxa de conectividade da Rede Global de Geoparques e da Rede Europeia de Geoparques.

A realização de entrevistas a nível local permitiram revelar os efeitos significativos e tangíveis da criação de geoparques no desenvolvimento local. Assim, foi selecionado o Qeshm Geopark (Irão) como estudo de caso, e as comunidades locais que vivem nas aldeias vizinhas do geoparque foram entrevistados.

Os dados foram analisados através de softwares de apoio à análise quantitativa, qualitativa e de redes, tais como o SPSS, NVivo e Pajek, respetivamente. Este último foi utilizado para produzir uma imagem da rede de relacionamento social entre os geoparques entrevistados.

Com base nesses resultados uma série de implicações são sugeridas, bem como algumas recomendações para futuras pesquisas.

Para além disso, a fim de investigar o papel do estabelecimento do Qeshm Geopark para o desenvolvimento rural, o trabalho de campo envolveu ainda entrevistas face a face com as comunidades locais e três matrizes SWOT foram projetadas para uma melhor gestão dos geoparques.

Utilizando ambas as abordagens qualitativa e quantitativa, esta tese visa contribuir para uma melhor compreensão do novo nicho de mercado que constitui o geoturismo, bem como dos novos destinos desenvolvidos em torno dos geoparque.

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List of abbreviations

ADRIMAG	Associação de Desenvolvimento Rural Integrado das Serras de Montemuro Arada e Gralheira	**A**
AONB	North Pennines Area of Outstanding Natural Beauty	
A.P.G. N	Asia Pacific Geoparks Network	
A.P.G.G.N	Asia Pacific Geoheritage and Geopark Network	
CAIRE	Centro Aragonés de Información Rural Europea	**C**
CCDRC	Commission for Coordination and Regional Development Centre	
CCT	Copper Coast Tourism	
CIT	Climate Index for Tourism	
CITES	Convention on International Trade in Endangered Species	
CSD	Centre for Sustainable Destinations	
EGN	European Geoparks Network	**E**
EMAS	Eco-Management and Audit Scheme	
EU	European Union	
GDP	Gross Domestic Product	**G**
GGN	UNESCO Global Geoparks Network	
GIS	Geographic Information System	
GPS	Global Positioning System	
GSI	Geotourism Survey Instrument	
GSWG	Geopark Shetland Working Group	
GTBS	Green Tourism Business Scheme	
IGU	International Geographical Union	**I**
INTERREG IV	Innovation& Environment Regions of Europe Sharing Solutions	
IUCN	International Union for Conservation of Nature	
IUGS	International Union of Geological Sciences	
ILO	International Labour Organization	
ISO	International Organization for Standardization	
LAG	Local Action Groups	**L**
LEADER	A European funding programme for rural development	
LNEG	Laboratório Nacional de Energia e Geologia	

MAB	Man and the Biosphere	**M**
NGO	Non-Governmental Organization	**N**
OECD	Organisation for Economic Co-operation and Development	**O**
OI	Open Innovation	
PoG	Popularisation of Geology	**P**
QFA	Qeshm Free Zone Area	**Q**
RGHP	Réserve Géologique de Haute-Provence	**R**
SMEs	Small and Medium-sized Enterprises	**S**
SNA	Survivable Network Analysis	
SWOT	Strengths, Weaknesses, Opportunities, and Threats	
SGP	Small Grant Programme	
TCI	Tourism Climate Index	**T**
UCC	University College Cork	.**U**
UNDP	United Nations Development Programme	
UNEP	United Nations Environment Programme	
UNESCO	United Nations Educational, Scientific and Cultural Organization	
UNU	United Nations University	
UNWTO	World Tourism Organisation	
URCA	Undergraduate Research and Creative Activity	
WCC	Waterford County Council	**W**

List of Publications

This doctoral thesis includes the following papers:

Journals:

I. Farsani TN, Coelho C, Costa C. 2010. Geoparks as Art Museums for Geotourists. Journal of Tourism and Development, 2 (13/14): 567-576.

II. Farsani TN, Coelho C, Costa C. 2011. Geotourism and Geoparks as Novel Strategies for Socio-Economic Development in Rural Areas. *International Journal of Tourism Research* 13(1): 68-81.

III. Farsani TN, Coelho C, Costa C. 2012. Geotourism and Geoparks as Gateways to Socio-Cultural Sustainability in Qeshm Rural Area, Iran. *Asia Pacific Journal of Tourism Research* 17 (1): 30-48.

IV. Farsani TN, Coelho C, Costa C. 2012. Tourism Crisis Management in Geoparks through Geotourism Development. Journal of Tourism and Development 2012 (17/18): 719-730.

V. Farsani TN, Coelho C, Costa C. 2012. Analysis of Network Activities in Geoparks as Geotourism Destinations, *International Journal of Tourism Research (in* press), (wileyonlinelibrary.com) DOI: 10.1002/jtr.1879

Book:

- Farsani TN, Coelho C, Costa C, Neto de Carvalho C. (Eds.). 2012. Geoparks and Geotourism: New Approaches to Sustainability for the 21th Century. Brown Walker Press Boca Raton, Florida, USA.

Conference papers:

- Farsani TN, Coelho C, Costa C. 2012. The Green Market in Geoparks through Eco-labels. The 11th European Geoparks *Conference* Arouca Global Geopark, Portugal 19-21 September 2012.

- Farsani TN, Amrikazemi, A., Coelho C, Costa C. Dakhteh, S.M. 2012. Geo-Education and Conservation of Natural Heritage via Creation of Geoparks. 5th International UNESCO Conference on Geoparks, Unzen Volcanic Area Global Geopark, Japan 12-15 May 2012.

- Farsani TN, Coelho C, Costa C. 2011. Gastronomy: The Novel Pedagogic Tool in Geoparks as New Geotourism Destinations. Tourism, Leisure and Culture Conference (CTLC2011 COIMBRA), University of Coimbra, Portugal, 27 - 29 September.

- Farsani TN, Coelho C, Costa C. 2011. Networks as an Innovative Approach in Geoparks and Geotourism. International Conference on Tourism & Management Studies, University of Algarve, Portugal, 26 - 29 October.

- Farsani TN, Coelho C, Costa C. 2011. Cultural Sustainability and Rural Development in Qeshm Geopark (IRAN). International Congress on Geotourism in Action, Arouca Geopark, Portugal 9-13 November.

- Farsani TN, Coelho C, Costa C. 2010. Geoparks as Innovative Tools for Geotourism Development. Congress on Tourism, Heritage and Innovation (CIT2010), Porto, Portugal, 21-23 June 2010.

- Farsani TN, Coelho C, Costa C. 2010. Rural Development via Geotourism and Innovative Strategies. 9th European Geopark Conference, Lesvos Island – Greece, 1 – 5 October 2010.

- Farsani TN, Coelho C, Costa C. 2009. Geotourism as an Opportunity for Local Communities' Participation in Geoparks. 8th European Geoparks Conference, Idanha-a-Nova, Geopark Naturtejo, Portugal, September 2009.

- Farsani TN, Coelho C, Costa C. 2009. Geotourism as an Opportunity for future Sustainable Socio-Economic Activities in Qeshm Island Geopark. International Conference Advances in Tourism Economics, Lisbon, Portugal, April 2009.

- Farsani TN, Coelho C, Costa C. 2008. Sustainable Tourism and the Conservation of Mangrove Forests in Qeshm Island Geopark. International Association for the Scientific Knowledge (IASK), Advances in Tourism Research, Aveiro, Portugal, May2008.

CHAPTER 1- Introduction

1.1. General Introduction

The tourism sector is a ‘market’ that uses cultural and natural heritage as a support for its backbone activities, such as promotion of destinations, accommodation, transportation, and catering. Hence, the new concept of geotourism as a new niche market with special interest in the geo – geology, geomorphology, and geodiversity– can add opportunities to cultural sustainability and rural development. Geotourism as a branch of sustainable tourism allows tourists and visitors to travel in a territory in order to experience, learn from, and enjoy earth heritage.

At present, geotourism is a new movement helping travellers to increase their knowledge about natural resources, the cultural identity of host communities, and ways of preserving them. The ‘emerging tourism’ niche of geotourism is still at an early stage of commercial development in most countries, and geoparks as a sustainable development model for protected areas are pioneers in the development of geotourism marketing. Likewise, the rapidly increasing numbers of United Nations Educational, Scientific and Cultural Organization (UNESCO) registered geoparks, up to 87 at the end of 2011 (Newsome *et al*., 2011), is good news for promoting geotourism and sustainable socioeconomic activities in rural areas.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) introduced the geopark *as a nationally protected area including a number of geological heritage sites of particular importance (geosites), rarity or aesthetic appeal. A geopark attains its goals through conservation, education, and geotourism* (UNESCO, 2006a). It is worth mentioning that in many cases, geoparks are not nationally protected areas which depend on the national laws for those territories.

According to the European Geoparks Network (EGN) charter and Global Geoparks Network regulations, geoparks should be established in rural areas (Zouros and Martini, 2003); thus, geoparks and geotourism can be opportunities for rural development, as they can effectively reduce the rate of unemployment and migration in rural areas by creating innovative strategies for local development. UNESCO and National Geographic Traveler’s declaration illustrated that geotourism has opened a new gateway to rural development (Zouros, 2010; Farsani *et al*., 2011a). It may be said that geotourism encompasses rural tourism and sustains or even enhances the geological characteristics of a place. Furthermore, geotourism follows sustainability principles, and thus it can be said that geotourism is under the umbrella of sustainable tourism. Sustainability as a general concept for tourism has three interconnected aspects: environmental, sociocultural, and economic (Cottrell *et al*., 2007).

Geotourism and geoparks claim to promote the local economy by sustainable tourism (McKeever and Zouros, 2005). Geoparks, by increasing the number of tourists visiting well-structured geological attractions, play an important role in the development of the local economy. When geotourists move to geoparks, the money moves in the same direction, as if geoparks were in fact exporting something such as agricultural and local products to other places. Geoparks have to support the local commercial production. Thus, visitors to geoparks can actually take with them, together with emotions, experiences and knowledge, manufactured goods (Frey *et al*., 2006). Moreover, geoparks strive to involve local communities in new job opportunities and geo-marketing, such as geotours, geo-products, geo-museums, geo-sports, geo-lodging, geo-restaurants and geo-bakeries.

Geoparks aim to promote the local economy and public awareness about geology. Regarding this, development of geotours guided by local people can be a strategy towards entrepreneurship. Geotour guides visit natural scenic landforms and explain the surface and inner earth processes that have shaped them (Robinson, 2008).

A geopark, besides tourism marketing, can successfully perform educational tasks for children including schoolchildren, and for local communities. The last but not the least of geopark targets is conservation. There is a direct relationship between geotourism and geoconservation; this relation directly influences the popularization of the geologic knowledge, didactics and scientific studies in this domain, as well as recreation (Alexandrowicz, 2006).

Furthermore, geopark conservation indirectly influences the socioeconomic prosperity of local people in the countryside of the geopark. Indigenous knowledge of local people and their work force are two key components in implementation of conservation methods in geoparks.

The major objective of this study is to investigate how geoparks and geotourism can contribute to sustainable tourism.

This thesis aims to evaluate the role played by geoparks in the development of the local economy, and minimization of negative sociocultural and environmental impacts of tourism. This is achieved by creating a positive upgrade in land management and planning for geoconservation and sustainable development of geological heritage.

Consequently, this thesis strives to identify geotourism and geoparks as a gateway and novel strategy for sociocultural, socio-environmental, and socioeconomic sustainability in rural areas. Moreover, this study has two more major purposes: 1) to determine the collaboration areas in Global Geoparks Network (GGN) and European Geoparks Network (EGN), and 2) to measure the degree of collaboration and cooperation among geoparks as geotourism destinations.

Additionally, the author focuses on innovative strategies in geoparks around the world in order to introduce geotourism as a market that can provide unique experiences for visitors through initiatives. It is evident that geoparks offer different facilities to tourists that are never experienced in other tourist destinations. Therefore, geoparks are new tourism destinations for geotravelers who want to know more about the earth where they live.

1.2. Objectives and Methodology

The research methodology for this study includes both primary and secondary research. A Combined method (qualitative and quantitative) was selected in this thesis. The first phase consists of an extensive literature review of existing reports on concepts of sustainable tourism, geotourism and geoparks.

The main objective of the study presented in this survey is to seek how geoparks and geotourism can contribute to sustainable tourism (Figure 1.1).

As illustrated in Figure 1.1, the objectives 1, 2, 3, 5, and 6 and the hypotheses 3 and 7 evaluate the socio-economical impacts of establishment of geoparks on rural development and development of geopark territories. Furthermore, objectives 1 and 4 and the hypotheses 4, 6, and 9 strive to identify the innovative and novel strategies in geoparks for promoting geotourism and attracting more tourists to these new destinations. The hypotheses 5, 6 and 8 and the objective 4 inquiry the role of geoparks in cultural sustainability and also investigate the strategies which highlight rural identities. Moreover, the Objective 5 and the hypotheses 1 and 2 examine the socio-environmental impacts of geoparks as another dimension of sustainable development. Lastly, the objective 6 and the hypotheses 1 and 2 evaluate the role played by tourism, especially geotourism, in achieving a better quality of life and education for local population and in stimulating economic growth in geoparks territories.

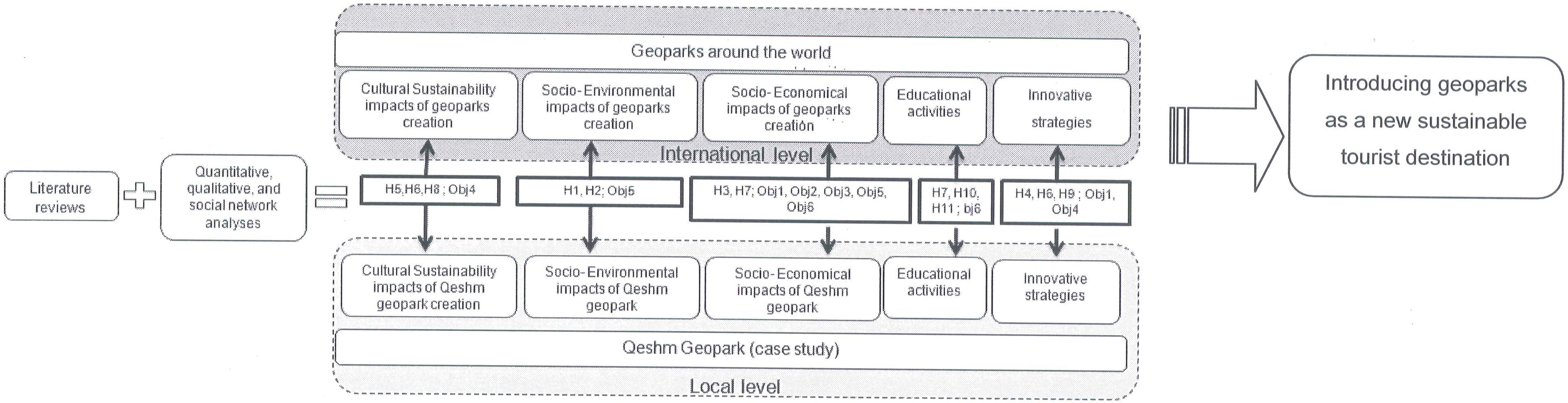
Observation was a technique used by author. Organizing field trips around the Naturtejo Geopark (Portugal), Arouca Geopark (Portugal) and Qeshm Geopark (Iran) helped the researcher to gain more understanding of the terms geopark and geotourism and to achieve a new vision of geopark activities.

It is noteworthy that travelling to all geoparks was expensive and time consuming, hence questionnaires were designed for data gathering. Data for this research were collected at two levels (international level and local level). Firstly, an electronic questionnaire sent to geoparks registered in UNESCO Global Geopark Networks; this questionnaire investigated the new strategies, policy and activities of geoparks. Gathering international data was conducted in two phases, the first phase was from March 2009 to January 2010 and the second – which related to collaboration between geoparks – from October to November 2010. These phases can be a way to get experiences from different strategies in geoparks to find the best solution for amelioration of the case study.

In the next phase the Qeshm Geopark (Iran) was selected as a case study and a questionnaire was designed for the local communities who live in the surrounding villages of Qeshm Geopark. Interviews in face-to face format at local level were conducted from July to August 2009. The questionnaires aim at evaluating the economic problems in rural areas and the role played by Qeshm Geopark in the development of the local economy and minimization of negative sociocultural and environmental impacts of tourism in local communities.

In this research the data was analysed using SPSS tools, NVivo, and Pajek software. Apart from quantitative and qualitative methods, SWOT analysis was applied to examine the strengths, opportunities, weaknesses and threats in the Qeshm Geopark territory.

At the end I am expected to create a methodology concerning different stages to promote sustainable tourism in geopark.



Objectives:

Obj1: To improve geotourism activities in geoparks

Obj2: To improve local economy

Obj3: To identify the role played by geoparks to improve the living conditions of the local populations

Obj4: To identify strategies for geotourism activities

Obj5: To engage the local communities in geotourism and geopark activities

Obj6: To evaluate the role played by tourism in achieving better quality of life and education for local population and stimulating economic growth

Hypotheses:

H1: Geoparks involve local communities in conservation activities

H2: Geoparks have positive socio-environmental impacts on local communities

H3: Geotourism activities in geoparks create opportunity for local development

H4: Using geotourism can be a useful strategy for developing tourism in geoparks

H5: Geoparks contribute to promoting regional geotourism products and local products

H6: Geoparks promote geotourism through innovative strategies

H7: Geoparks contribute to increasing the geological knowledge and employment of local communities in rural areas and geoparks territories

H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by local communities

H9: Geoparks do not function similarly in terms of management

H10: Network activity in EGN is stronger than in the GGN

H11: The majority of collaboration in GGN and EGN is concentrated in the field of exchange of knowledge and knowledge transfer

Figure 1.1- Hypotheses and objectives of thesis (Source: own construction)

1.3. Interest and Scope of the Thesis

Nowadays tourists want to find out more about the outside world. They want to try out new experiences and increase their knowledge (Poon, 1993). It can be said that new framework conditions such as airline deregulation, economic restructuring, environmental awareness, consumer protection, and the increased spread and flexibility of vacation days, are giving rise to a new tourism (Poon, 1993).

In the last decade, geotourism has been introduced as a new niche market that shows travellers how to increase their awareness about natural resources and ways of preserving them by outdoor and recreational activities. In geoparks, tourists can see something different from other tourism activities. According to the National Geographic definition, "Geotourism is a market of about 55.1 million travelers who seek authentic experiences, care about the protection and preservation of the places they visit, and are willing to spend more money to achieve these goals. Average ages range from 43-55 years, average household incomes are high with 38-46% earning more than $75,000 annually, average number of leisure trips taken each year is 4 or more, and education levels are also high[1]". Regarding their high education, geotourists require the opportunity to take advantage of educational and interpretative facilities provided by tourism organizations. Nowadays geoparks are ideal destinations for tourists, since, as a living outdoor museum and messengers of geotourism, they apply innovative strategies, which not only improve the local economy but also develop tourists' knowledge. Moreover, involving indigenous people in local geotourism marketing helps to increase cultural communication between geotourists and local communities. This study introduces geoparks as new tourism destinations for those who are interested in local culture and natural sciences, in particular geosciences, and for those willing to learn more about their place in our dynamic earth.

[1] National geographic (2009) ;

http://industry.traveloregon.com/upload/otc/departments/tourismdevelopment/geotourismwebsiterfpfinal.pdf

1.4. Organization of the Thesis

The thesis is divided into six chapters. The first chapter identifies the main objectives of the thesis; the methodology adopted to reach them; and the thesis' organization. Chapter two begins with a description of sustainable tourism in order to identify principles and objectives of sustainable tourism. Section 2.4 focuses on emergence of geotourism marketing. Section 2.5 discusses geopark concepts, theories and paradigms and their targets. The next section presents the comparison between geoparks and protected natural areas. Section 2.7 can provide a guideline for the proposed geoparks which want to become a Global Geoparks Member. And the eighth section discusses geo-products and branding in geotourism destinations such as geoparks. In this section through introduction of geo-products in geoparks and various definitions of geo-products the author place emphasizes on her definition for geo-products.

Sections 2.9, 2.10 and 2.11 provide an overview of the effect of establishment of geoparks on the local economy, cultural sustainability and socio-environmental sustainability. The last sections are a review of innovative strategies in geoparks and the importance of network activity as an innovative approach for rural development.

Chapter three discusses methodology and techniques applied in the research. Chapter four, part one draws attention to geographical areas where the empirical study was conducted. Innovative strategies, activities and geological characteristics of 29 geoparks that replied to the questionnaires are explained in this chapter. Moreover, chapter four, part two consists of analysis and discussion of findings of the empirical study. This chapter explores the effect of establishment of geoparks on cultural, socio- environmental and socio-economical sustainability.

Chapter five deals with the characterization of the geographical area of the Qeshm Geopark as a case study. Detail description of the geological, ecological and cultural heritage of the case study is also organized in this chapter. It is noteworthy that experiences gained from two previous chapters and thoroughness of the case study helped us to design the SWOT matrices for Qeshm Geopark in section 5.1. 9. Furthermore, chapter five, part two investigates the effect of establishment of Qeshm Geopark on cultural, socio- environmental and socio-economical sustainability. Lastly, chapter six focuses on a conclusion, and strives to recommend some guidelines for aspiring geoparks and better management of the case study. Moreover, chapter six introduces some future issues in geopark research.

CHAPTER 2- Literature Review of Concepts related to Geopark and Geotourism

2.1. Introduction

This chapter explains how the methodology of the literature review evolved. It provides an overview of sustainable tourism in order to identify principles and objectives of sustainable tourism; this chapter also describes the emergence of geotourism as a branch of sustainable tourism to discover the relationship between geotourism and the local economy in geoparks. Section 2.5 discusses the geopark concepts, theories and paradigms. The next section presents the comparison between geoparks and protected natural areas. Section 2.7 highlights guidelines and criteria for proposed and aspiring geoparks which want to become a GGN (Global Geoparks Network) Member. Section 2.8 introduces geo-products as an innovation in geoparks. The next three sections summarize the effect of the establishment of geoparks on cultural sustainability, socioeconomic and socio-environmental development in rural areas. Section 2.12 focuses on innovation in geoparks and section 2.13 indicates network activities as innovative approach in rural areas.

2.2. Methodology for Literature Review

The first phase of this thesis consists of an extensive literature review of existing reports on geotourism and geopark activities.

Open Innovation (i.e. innovation inside and outside the firm's frontiers, with external partnerships or outsourcing) is a recent topic in academic studies. At the end of 2010, with a view to doing literature review, first, the author performed an in-depth review of Open Innovation (OI) papers published in quoted scientific journals in the last ten years. The author used as search parameters keywords such as geopark, geotourism, rural tourism, sustainable tourism, socioeconomic development, sociocultural development. She started by performing the literature review as follows:

• Individual search in scientific databases, e.g. Elsevier (Science Direct) and ISI Web of knowledge

• Search on Google Scholar

Results for ISI Web of Knowledge (by end of 2010) obtained 33 papers for geoparks and 21 papers for geotourism (Table 2.1).

Table 2.1- Numbers of records in ISI Web of Knowledge for key words

Key words	Records in ISI web knowledge
Geopark	33
Geopark AND “socio economic”	0
Geopark AND “sustainable tourism”	3
Geopark AND “socio cultural”	2
Geopark AND “rural tourism”	0
Geopark AND “rural development”	0
Geopark AND “sustainable development”	6
Geopark AND “local”	5
Geotourism	21
Geotourism AND “socio economic”	1
Geotourism AND “sustainable tourism”	0
Geotourism AND “socio cultural”	0
Geotourism AND “rural”	1
Geotourism AND “local”	4
Geotourism AND “sustainable development”	3

Moreover, the author used the analysis function available in ISI Current Contents to perform descriptive statistics on the papers. The results present information on years of publications (Tables 2.2 and 2.3). The results indicated that the majority of the papers about geoparks or geotourism were published in 2009.

The results demonstrate that the topic is new and geoparks and geotourism are new subjects recently; so geopark activities have not been studied thoroughly yet.

Following web sites, publications, and centres (UNESCO Global Geopark Network, European Geopark Network, UNESCO, National Geography, Online library of universities, the web sites of geoparks, library of University of Aveiro, monthly newsletter of Naturtejo

Geopark, newsletter of Global Geoparks Network, on line journals, SGP (Small Grant Programme) website, geoparks publications, IUGS (International Union of Geological Sciences), IUCN (International Union for Conservation of Nature), IGU (International Geographical Union), Statistical Centre of Iran, Iran libraries and conferences proceeding) played an important role in contributing to the collection of information for this thesis. The geopark and geotourism concepts are introduced below.

Table 2.2- Top publication year value for the keyword “geotourism”

Field: Publication Year	Record Count	% of 21	Bar Chart
2008	6	28.5714 %	
2009	6	28.5714 %	
2004	2	9.5238 %	
2006	2	9.5238 %	
2010	2	9.5238 %	
Field: Publication Year	Record Count	% of 21	Bar Chart
(3 Publication Year value(s) outside display options.)			

Table 2.3- Top publication year value for the keyword “geopark”

Field: Publication Year	Record Count	% of 33	Bar Chart
2009	9	27.2727 %	
2008	7	21.2121 %	
2007	5	15.1515 %	
2010	5	15.1515 %	
2004	2	6.0606 %	
2005	2	6.0606 %	
Field: Publication Year	Record Count	% of 33	Bar Chart
(3 Publication Year value(s) outside display options.)			

2.3. Sustainable Tourism Concept

A rapid increase in per capita income and leisure time, and advances in technology have led to increased demands for recreation and holidays for a considerable number of people all over the world. Inevitably, such large-scale tourism activity has both positive and negative consequences for the economy, environment, and the society of the host destinations. Therefore, tourism has been referred to as a 'revolution'. On the positive side, tourism is considered a tool of economic regeneration, a means for heritage and environment preservation and citizens' awareness, the creation of infrastructure and equipment, cultural communication, and political stability. On the other hand, since the tourism product is consumed in the same place as its production, tourism development has come under criticism for various social and environmental strains experienced by host destinations and populations, such as environmental degradation, cultural pollution, commercialization of human relations and negative demonstration effects (Andriotis, 2000). In this regard, the term 'sustainable tourism' originated from the general concept of 'sustainable development' which '*meets the needs of the present without compromising the ability of future generations to meet their own needs*' introduced by Brundtland in 1987 (Beeton *et al*., 2007).

Sustainability as a general concept for tourism, as for other industries, has three interconnected aspects: environmental, sociocultural, and economic. Sustainability implies permanence, so sustainable tourism includes the optimum use of resources, including biological diversity, minimization of ecological, cultural, and social impacts, and maximization of benefits for the conservation of natural and cultural heritage and local communities. It also refers to the management structures that are needed to achieve this.

Following the Rio Earth Summit in 1992 and the growing realization of the importance of a sustainable approach to tourism development, a number of international organizations began efforts to develop principles to guide the development of sustainable tourism. In 1995, the United Nations Environment Programme (UNEP), the United Nations Educational Scientific and Cultural Organization (UNESCO), the European Union (EU) and the World Tourism Organization (UNWTO) organized a world conference on sustainable tourism in Lanzarote, Canary Islands (Spain). The conference produced the first agreement on how sustainable tourism should be developed. The Lanzarote Charter for Sustainable Tourism (1995) defined 18 principles, which in turn define how tourism should be developed and it has been the basis for much work that has been done since then. The 18 principles and objectives of the Declaration are as follows: (UNEP, 1995).

1. *Tourism development shall be based on criteria of sustainability, which means it must be ecologically bearable in the long term, economically viable, as well as ethically and socially equitable for local communities. Sustainable development is a guided process, which envisages global management of resources so as to ensure their viability, thus enabling our natural and cultural capital to be preserved. As a powerful instrument of development, tourism can and should participate actively in the sustainable development strategy. A requirement of sound management of tourism is that the sustainability of the resources on which it depends must be guaranteed.*
2. *The sustainable nature of tourism should integrate the natural, cultural and human environment; it must respect the fragile balances in many tourist destinations, in particular many small islands and environmentally sensitive areas. Tourism should ensure an acceptable evolution as regards the influence of the activity on natural resources, biodiversity and the capacity for assimilation of any impacts and residues produced.*
3. *Tourism must consider its effects on the cultural heritage and traditional elements, activities and dynamics of each local community. Recognition of the traditional elements and activities of each local community and support for its identity, culture and interests must at all times play a central role in the formulation of tourism strategies, particularly in developing countries.*
4. *The active contribution of tourism to sustainable development necessarily presupposes the solidarity, mutual respect, and participation of all the actors implicated in the process, especially those indigenous to the locality. Solidarity, mutual respect and participation must be based on efficient cooperation mechanisms at all levels: local, national, regional, and international.*
5. *The conservation, protection, and appreciation of the worth of our natural and cultural resources afford a privileged area for cooperation. This approach implies that all those responsible must take upon themselves a true challenge, that of cultural and professional innovation, and must also undertake a major effort to create integrated planning and management instruments. This approach must ensure that all responsible actors have instruments of cooperation and management integrated, including technological innovation.*
6. *In consultation with interested and affected parties, the preservation of both the quality of the tourist destination, and the capacity to satisfy tourists should be*

determined by local communities and should represent priority objectives in the formulation of tourism strategies and projects.

7. *To be compatible with sustainable development, tourism must be based on the diversity of opportunities offered by its local economy. It should be fully integrated into and contribute positively to the local economic development.*
8. *All options for tourism development must serve effectively to improve the quality of life of all people and must entail a positive effect and inter-relation.*
9. *Governments and authorities shall promote actions for integrating the planning of tourism with environmental NGOs and local communities to achieve sustainable development.*
10. *In recognition of the objective of economic and social cohesion among the people of the world as a fundamental principle of sustainable development, it is urgent that measures be developed to permit a more equitable distribution of the benefits and burdens of tourism. This implies a change of consumption patterns and the introduction of ecologically honest pricing. Governments and multilateral organizations are called upon to abandon subsidies that have negative effects on the environment, and they are furthermore called upon to explore the application of internationally harmonized economic instruments to ensure the sustainable use of all resources.*
11. *Environmentally and culturally vulnerable spaces, both now and in the future, shall be given special priority in the matter of technical cooperation and financial aid for sustainable tourism development. Similarly, special treatment should be given to spaces that have been degraded by obsolete and high impact tourism models. Tourism should be spread over a greater part of the calendar year. There is also a need to explore further the usefulness of economic instruments at the regional/local levels, with a view to ensuring the sustainable use of all resources. The importance of legal instruments must be developed.*
12. *The promotion of alternative forms of tourism compatible with the principles of sustainable development and the encouragement of diversification help guarantee medium- and long-term sustainability. In this respect, there is a need, for many small islands and environmentally sensitive areas in particular, to actively pursue and strengthen regional cooperation.*

13. *Governments, authorities, and NGOs with responsibility for tourism and the environment shall promote and participate in the creation of open networks for information, research, dissemination, and transfer of appropriate tourism and environmental knowledge on tourism and environmentally sustainable technologies.*
14. *There is a need to support and promote feasibility studies, vigorously applied scientific field work, the implementation of tourism demonstration projects within the framework of sustainable development, the development of programs in the field of international cooperation, and the introduction of environmental management systems.*
15. *Authorities and associations with responsibility for tourism development, and environmental NGOs shall draw up frameworks for sustainable tourism development and will establish programs to support the implementation of such practice. They shall monitor achievements, report on results, and exchange their experiences.*
16. *Attention should be given to the role and environmental effects of transportation in tourism, and economic instruments should be developed and implemented in order to reduce the use of non-renewable energy.*
17. *The adoption of, adherence to, and implementation of codes of conduct conducive in the context of sustainable development by the principal actors, particularly industry members, involved in tourism are fundamental for tourism to be sustainable. Such codes constitute efficient instruments for the development of responsible tourist activities.*
18. *All necessary measures should be implemented in order to sensitize and inform all the parties involved in the tourism industry.*

To support the integration of sustainability into tourism policies, UNEP (United Nations Environment Programme) and the World Tourism Organization (WTO) conducted research on approaches and tools for the development and implementation of sustainable tourism policies, which have shown them to be effective in practice. Sustainable tourism is often equated with nature tourism or ecotourism; but sustainable tourism development means more than protecting the natural environment. It means proper consideration of host people, communities, cultures, customs, lifestyles, and social and economic systems. It is tourism that enhances the material life of local communities, without causing a loss of traditional employment systems, acculturation, or social disruption.

Drost (1996) discussed how sustainable tourism development would entail the adoption of planning strategies to mitigate the negative impact of tourism without sacrificing its benefits. He believes that educating and raising people's awareness of the physical and sociocultural environment are fundamental for achieving sustainable development. It is noteworthy that education is equally necessary for the host population and governments, and if it is to be effective, it should include periodic educational workshops and sharing of experiences and knowledge among countries regarding their respective approaches to controlling the negative impact of tourism. Sustainable tourism should not be regarded as a rigid framework, but rather as an adaptive paradigm, which legitimizes a variety of approaches according to specific circumstances.

Moreover, sustainable tourism is not achievable in the absence of strong local authority planning and development control, and without the involvement of local communities in the planning process (Hunter, 1997). Godfrey (1998) noted that to achieve sustainability, local government requires less emphasis on short-term economics, with greater recognition of the social and environmental implications of the industry, and that local government should support the integration of tourism interests within the context of all local socioeconomic development, rather than as a unique or isolated activity.

The World Tourism Organization (1998) defined 'sustainable tourism', *as the tourism development that meets the needs of present tourists and host regions, while protecting and enhancing opportunities for the future leading to management of all resources, in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems* (Byrd, 2007: 9). The evolution of the sustainable tourism concept is illustrated in Figure 2.1.

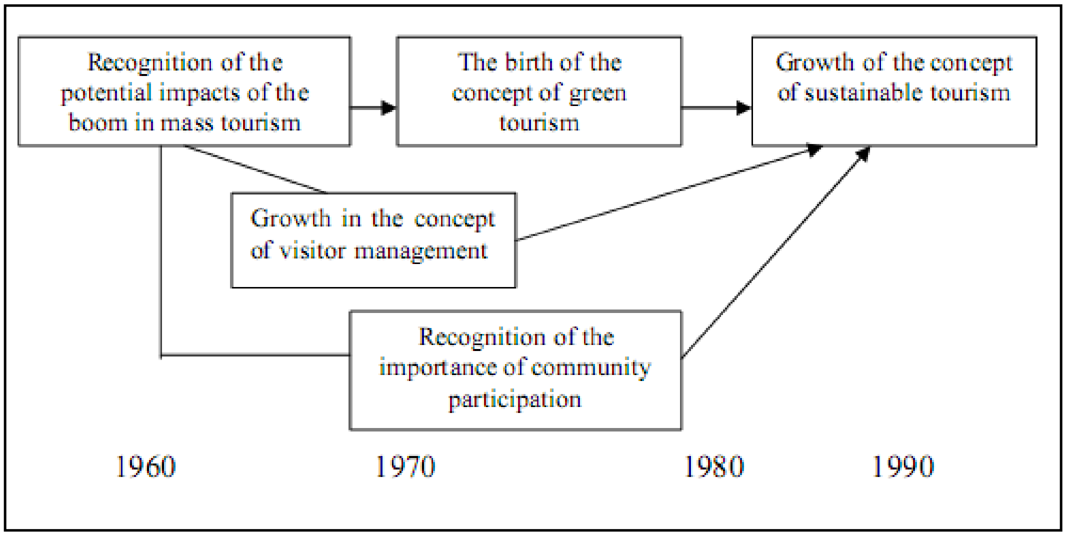


Figure 2.1- The evolution of the sustainable tourism concept
(Source: Hunter, 2006)

It must be mentioned that the appearance of a journal (Journal of Sustainable Tourism) devoted to sustainable tourism topics is a sizeable body of literature which publishes the recent definitions and state-of-the-art reviews related to sustainable tourism (Butler, 1999). Many authors and practitioners promote ecotourism, alternative tourism, responsible tourism, soft tourism, low-impact tourism, community tourism, and so on, as the path to sustainable tourism development (Liu, 2003). Jafari's 'platform' model named 4 key platforms (advocacy, cautionary, adaptancy and knowledge-based) to provide a useful framework for understanding the emergence and development of sustainable tourism (Jafari, 1989; 2001). There are seven steps towards tourism sustainability: understanding complex adaptive systems; learning from natural ecosystems; co-evolution of human and natural systems; extending tourism systems; integration; adding post-normal science; and facilitating a transition (Farrell, 2005).

Byrd (2007) argued for several indicators (stakeholder knowledge, perceived impacts of tourism development, support for tourism development, resident population demographics, attendance numbers at attractions, occupancy rate, host community attitudes toward tourism development, resident involvement in tourism development, local resident participation in planning, and availability of a resident advisory board) which can be used for stakeholder participation in a community. Governments must communicate with the local population and involve them in planning and management decisions while offering a fair distribution of the benefits and cost among the full range of stakeholders (Yasarata *et al.*, 2010). Local communities must be engaged in each stage of the development process: planning, implementing and monitoring (Choi and Murray, 2010; Whitford and Ruhanen, 2010).

In addition, Liu (2003) noted that there are interrelationships between tourism, the environment, and the local community. The traditional sustainable development paradigm contains economic, ecological, and sociocultural dimensions. The economic dimension satisfies the primary needs of humans and implies that the economy supports employment and livelihoods on a competitive and stable macroeconomic scale. The ecological dimension characterizes the need to utilize the environment within ecological limits. The social-cultural dimension (i.e., individuals' skills, dedication, and experiences) meets individuals' needs to live a dignified and healthy life.

These three dimensions cannot be disassociated from a fourth institutional dimension that emphasizes participatory decision-making processes and public involvement (Figure 2.2). This dimension refers to the level of public participation in political governance.

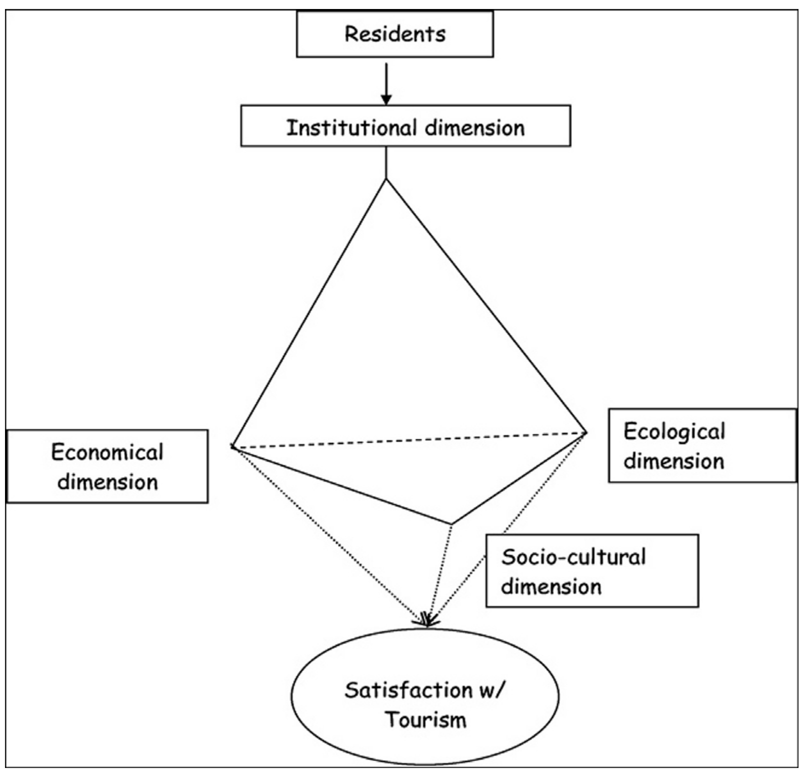


Figure 2.2- Prism of sustainability

(Source: Cottrell *et al*., 2007)

Successful sustainable tourism requires an integrated vision of policy, planning, and management within the institutional context. Although the institutional component has received the least attention of the three classic dimensions, Cottrell *et al*. (2007) have found that all four dimensions contribute to attracting residents' satisfaction, with the institutional dimension explaining the greatest percentage of variance for residents' satisfaction with tourism. Moreover, the participation of a community in local tourism stimulates locals through arousing a feeling of belonging to that place and making them feel responsible for maintaining their cultural heritage (Botelho da Costa and Nascimento, 2008).

Recently, network activity as an innovation in sustainable tourism planning has been shown to bring certain benefits to all stakeholders. The experiences of Jennings and Zandbergen (1995) illustrated that individual stakeholders contribute less to environmental sustainability than networks of agents. According to Bramwell and Sharman (1999) cooperation and collaboration are recognized as major aspects in tourism planning and are linked to the idea of sustainable tourism development. Policy networks include two forms (vertical or horizontal). Agencies organized at the same level are classified into horizontal networks, while, relationships between different levels of government (local, regional, and national) are formed in vertical networks (Hall, 1999). Networks of collaboration are key components in environmental management (Robert and Simpsone, 1999). The experiences of Dredge (2006) in Lake Macquarie (Australia) illustrated that in network activities, stakeholders can have membership of more than one network and stakeholder powers, roles, interactions and functions may become stronger. Moreover, collaboration in the form of a network creates opportunities for communication, for dialogue, for the development of new ideas, and for the translation of ideas into practice. ErkuŞ-Öztürk and Eraydin (2010) noted that collaborative work in the form of networking and local collaboration in Antalya (Turkey) has provided more protection than individual organizations (Figure 2.3).

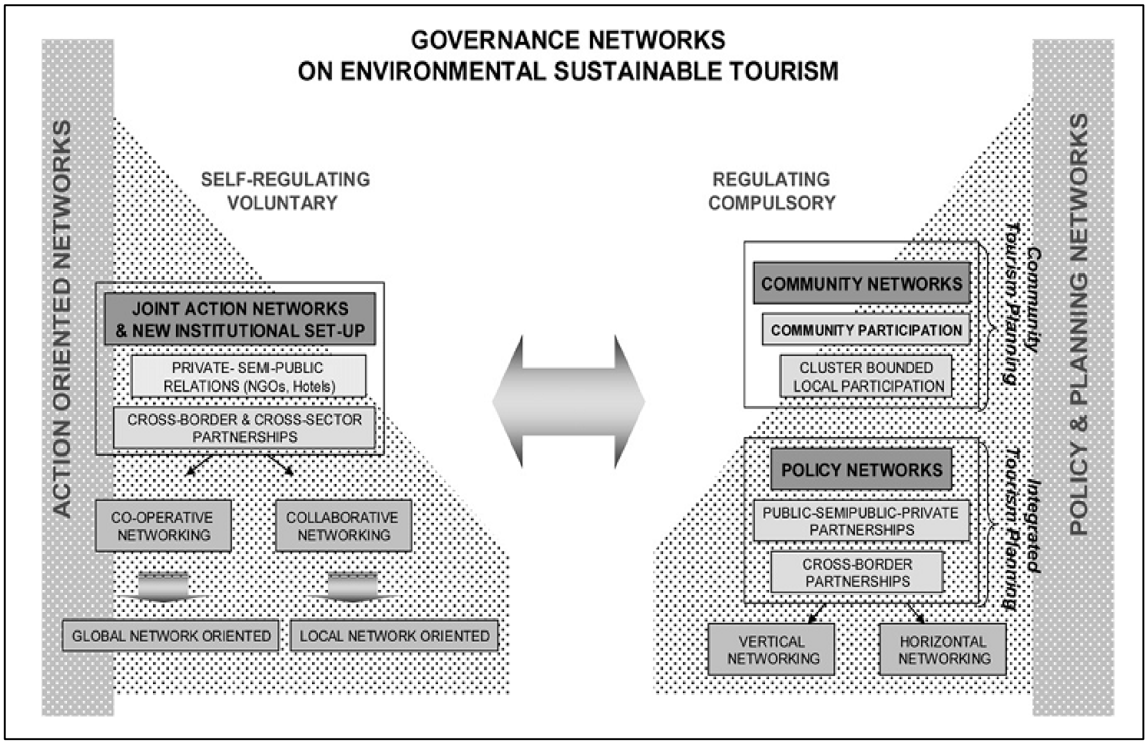


Figure 2.3- Governance networks observed in environmentally sustainable tourism
(Source: ErkuŞ-Öztürk and Eraydin, 2010: 115)

Each type of network has strengths and weaknesses in promoting sustainable tourism. The experiences of Beaumont and Dredge (2010) in Redland City Council (Australia) illustrated that different types of networks can be more or less effective in achieving good local tourism governance.

Recently, the gap between local communities and tourists has decreased; many communities in tourism destinations have organized themselves in defence of their cultural and natural heritage. At the head of these, the EUROPARC Federation defined the European Charter for Sustainable Tourism in Protected Areas (1994). This charter provided an opportunity for network activity, making new ideas, conservation of the environment and heritage, economic and social development, preservation and improvement of the quality of life of local residents and visitor management, and enhancement of the quality of tourism offered (EUROPARC Federation, 2007).

According to Woodley (1993:94), sustainable tourism in parks must primarily be defined in terms of sustainable ecosystems. Complexity of the protected area system (local-to-global impacts), structure and forms of partnerships/collaboration, with particular focus on sustainability and stakeholders and the issue of representing nature in planning and negotiation, are three aspects which are important for the development of tourism in protected areas (Jamal and Stronza, 2009).

Subsequent to the European Charter, the European Geoparks Network (EGN) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), through creating a worldwide network of geoparks, take advantage of networks of collaboration in environmental management. The geopark as a new form of sustainable development and as a new model of protected area not only strives to popularize geological and geomorphological heritage, but also stimulates local socioeconomic development through the promotion of geotourism as a branch of sustainable tourism.

Nowadays, geoparks as an innovation try to connect conservation, education, and geotourism. Regarding this, a geopark, besides tourism marketing, can successfully perform educational tasks. There is a direct relation between geotourism and geoconservation; this relation directly influences the popularization of geological knowledge, didactics and scientific studies in this domain, as well as recreation (Alexandrowicz, 2006). It is worth mentioning that education on nature in geoparks, especially for schoolchildren, is very important for the development of the supportive local and regional community in the future.

2.4. The Emergence of Geotourism

Geotourism, which was introduced publicly in 2002 by the Travel Industry Association of America and National Geographic Traveller Magazine, incorporates sustainability principles (Alan, 2002). They introduced geotourism *as tourism that sustains, or even enhances, the geographical character of a place, such as its culture, environment, heritage, and the well-being of its residents* (Tourtellot, 2000: 2).

In 1997, National Geographic senior editor Jonathan B. Tourtellot and his wife, Sally Bensusen, coined the term geotourism in response to requests for a term and concept more encompassing than ecotourism and sustainable tourism (Figure 2.4). Like ecotourism, geotourism promotes a virtuous circle, whereby tourism revenues provide a local incentive to protect what tourists are coming to see, but extends the principle beyond nature and ecology to incorporate all characteristics that contribute to a sense of place, such as historic structures, traditional culture, landscapes, cuisine, arts and artistry, as well as local flora and fauna.

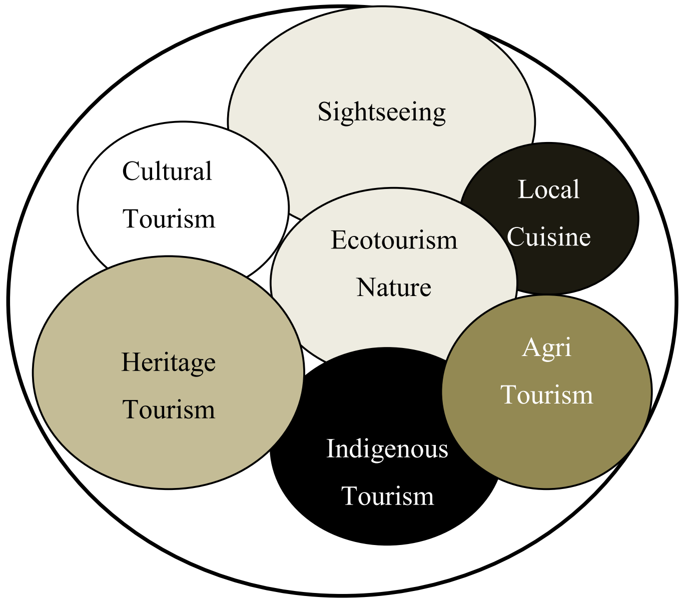


Figure 2.4- Geotourism model (Source: National Geographic, 2005)

Therefore, geotourism manages to protect all aspects of a tourist destination such as: flora and fauna, history, archaeology, geology, traditional architecture, local music, cuisine, local crafts, and arts (National Geographic, 2005 and 2009).

Tourtellot's definition of geotourism is not entirely original, but evolved from the previous concept of sustainable development, sustainable tourism, and ecotourism. Geotourism differentiates itself from ecotourism through focusing on the geological and geomorphological character of a region while many of ecotourism's definitions limit ecotourism to only occurring in protected or natural areas and are mainly related to biodiversity.

Since geotourism is a niche market, it tends to be small and specialized; this market includes less impact, and interests visitors who seek a specific experience, activity and place. Therefore geotourism is less likely to negatively impact the area (Gorman, 2007).

National Geographic (2009) noted that geotourism adds to sustainability principles, its "sense of place", to emphasize the distinctiveness of its locale and benefit visitor and resident alike:

- **Geotourism is synergistic:** all the elements of geographical character work together to create a tourist experience that is richer than the sum of its parts, appealing to visitors with diverse interests.

- **It involves the community:** local businesses and civic groups join to provide a distinctive, authentic visitor experience.
- **It informs both visitors and hosts:** residents discover their own heritage by learning that things they take for granted may be interesting to outsiders. As local people develop pride and skills in showing off their locale, tourists get more out of their visit.
- **It benefits residents economically:** geotourism benefits travel businesses, local workers, local services, products, and supplies. When community members understand the benefits of geotourism, they take responsibility for destination stewardship.
- **It supports integrity of place:** destination-savvy travellers seek out businesses that emphasize the character of the locale. In return, local stakeholders who receive economic benefits appreciate and protect the value of those assets.
- **It means great trips:** enthusiastic visitors bring home new knowledge. Their stories encourage friends and relatives to experience the same thing, which brings continuing business for the destination.

The first definition of geotourism as 'geological tourism' was published by Hose (1995, 2000). According to Słomka and Kicinska- Świderska (2004), in Poland geotourism is a branch of cognitive tourism or adventure tourism which emphasize geological objects (geosites) and recognition of geological process. Some new terms in geotourism such as geotouristic objects (geosites); geotouristic events; and geotouristic attractions were also introduced (Słomka et al., 2006; Słomka and Mayer, 2010). Rybár (2006) recommended geotourism with accent on mining tourism. He believes that mining tourism has positive social and economic impacts on the former and old European mining regions. Subsequently, the first definition of geotourism was refined by Dowling and Newsome (2006), and Newsome and Dowling (2010).

Hose (2008) noted that the term geotourism passed into general usage in the early 1990s, although its past history dates back to the seventeenth century. Its resource base includes geosites, museums, library and archive collections and artistic outputs.

According to Dowling and Newsome (2006) geotourism encompasses wider geographical, socioeconomic and cultural contexts which sit under the umbrella of geographical tourism. It is evident that geographic tourism involves geotourism as a target of geoparks (Figure 2.5). It is worth mentioning that the conceptualization of geotourism was improved in the book titled: “Geotourism: sustainability, impacts and management” (Dowling and Newsome, 2006). In this book geotourism was conceptualized into a three-sided box: geological form, process, and tourism. Moreover, geotourism involves visits to geosites for the purpose of recreation, engaging a sense of wonder and learning.

After that, Newsome and Dowling (2010) discussed the relation between geotourism and other forms of tourism. Figure 2.6 illustrates a particularly strong relationship between ecotourism and geotourism (dotted and thick line). This definition, like the National Geographic definition, includes ecotourism and cultural tourism, but the emphasis of Newsome and Dowling’s (2010) definition is on geology.

A list of different geotourism definitions is presented in Table 2.4. The lack of a common unifying definition for geotourism signifies only that geotourism is an interdisciplinary knowledge still at the very beginning.

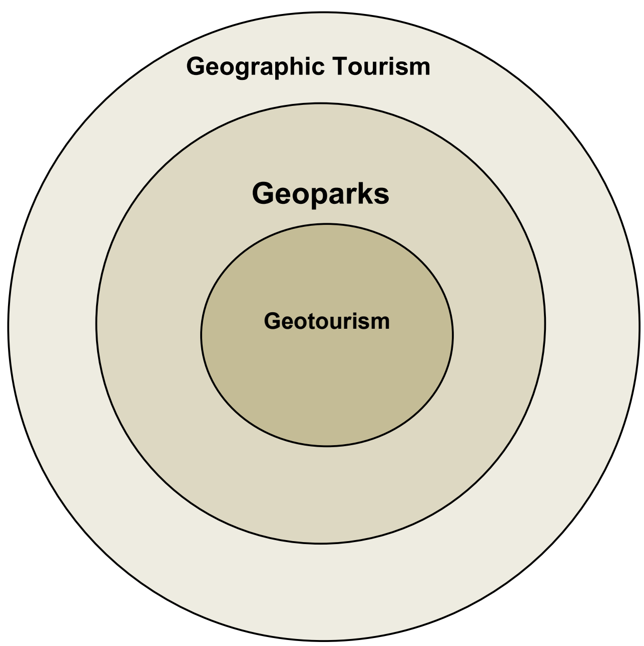


Figure 2.5 - The existing spectrum of geotourism (Source: Dowling and Newsome, 2006)

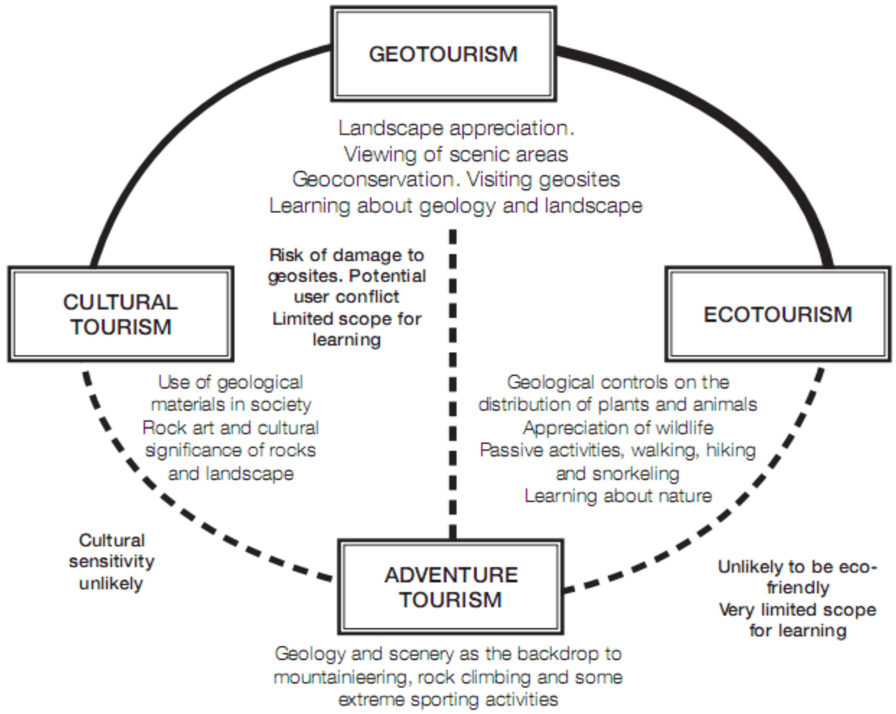


Figure 2.6 - The relationship of geotourism with other forms of tourism

(Source: Newsome and Dowling, 2010)

Table 2.4 - Definitions of geotourism from 2000

Geotourism is "tourism that sustains, or even enhances, the geographical character of a place, such as its culture, environment, heritage, and the wellbeing of its residents. The concept was introduced publicly in a 2002 report by the Travel Industry Association of America and National Geographic Traveler magazine (Tourtellot, 2000: 2).
Geotourism is an emerging niche market within sustainable tourism and is centered on sustaining and enhancing the geographical character of a place (Stokes *et al.*, 2003:1).
Geotourism may constitute a segment of ecotourism, which is "a sustainable form of natural resource-based tourism that focuses primarily on experiencing and learning about nature, and which is ethically managed to be low-impact, non-consumptive, and locally oriented (control, benefits and scale). It typically occurs in natural areas, and should contribute to the conservation or preservation of such areas (Fennell 2003: 32).
Geotourism is not a new definition, but simply a way of combining developing concepts of sustainability accounting with developing concepts of tourism market segmentation (Buckley, 2003: 76-82).
Geotourism will be identified as a branch of geology, important for the development of the national economy (Hose, 2000; Słomka, and Kicińska-Świderska, 2004).

Table 2.4 - Definitions of geotourism from 2000 (cont.)

Geotourism is a multi-interest kind of tourism exploiting natural sites and landscapes containing interesting earth-science features in a didactic and entertaining way (Pralong, 2006:20-25).
According to Frey 1998, geotourism means interdisciplinary cooperation within an economic, success-oriented and fast-moving discipline that speaks its own language (Frey et al., 2006: 97).
Geotourism is a new occupational and business sector. The main tasks of geotourism are the transfer and communication of geo-scientific knowledge and ideas to the general public (Frey et al., 2006: 97).
Geotourism is sustainable tourism with a primary focus on experiencing the Earth's geological features in a way that fosters environmental and cultural understanding, appreciation and conservation, and is locally beneficial (Dowling and Newsome, 2006: 3-25).
Geotourism comprises the geological elements of 'form and process' combined with the components of tourism such as attractions, accommodation, tours, activities, interpretation and planning and management (James and Hose, 2008: 199-208).
In 2008, the Travel Industry Association declared that Geotourism celebrates sense of place while supporting principals of conservation related to a destination's natural resources, culture, heritage and traditions. It incorporates travel sectors such as lodging, shopping, entertainment, dining, and touring when they provide and promote authentic experiences distinctive to the character of the locale, and do so in a way that benefits the local community (Miller and Washington, 2009: 170-172).
Geotourism is a form of natural area tourism that specifically focuses on geology and landscape. It promotes tourism to geosites and the conservation of geodiversity and an understanding of Earth sciences through appreciation and learning. This is achieved through independent visits to geological features, use of geo-trails and view points, guided tours, geo-activities and patronage of geosite visitor centres (Newsome and Dowling, 2010: 4-5).

This study employs the last four definitions of geotourism to discover the innovative strategies and novel trends in travel to geoparks and rural development.

Aside from geoparks, which are under the umbrella of UNESCO, National Geographic also introduces some geotourism destinations around the world. In July 2008, five U.S. government agencies joined the National Geographic Society to formally adopt the principles of geotourism (Moffet and Moody, 2008). In December 2005, the states of Arizona in the United States and Sonora, Mexico, signed a National Geographic Geotourism Charter in order to promote sustainable tourism and destination stewardship in the Sonoran Desert region. This project included preparing a Geotourism map guide and an associated website for two geotourism products that encompassed both cultural and environmental concerns in order to introduce the natural phenomena to tourists. This was the fourth Geotourism Charter issued worldwide and the first transnational effort undertaken by the National Geographic Society. In The First Transnational Geotourism Project, they decided to establish a Geotourism Council. The Council would lead a bi-national grassroots effort to develop a regional map guide, promote the tenets of geotourism, and encourage destination stewardship in the region (Murrieta *et al*., 2005).

National Geographic's ambition is to protect distinctive travel regions of the world through a type of tourism that focuses on destination stewardship. Their tools for preserving these regions are geotourism map guides. These geotourism map guides are a hybrid cross between guidebooks and road maps. Instead of reading a guidebook and map separately, the map guides spatially represent the unique tourism destinations of a region by overlaying destination information on top of a relief map of the region. These maps provide tourists with information on historic sites, cultural sites, accommodation, hikes, and many other types of information, allowing the tourist an opportunity to experience what makes the region special (Boley, 2009). Bosak *et al*. (2010) noted that geotourism map guides, such as the Crown of the Continent, constitute a useful tool to promote a more responsible form of tourism and allow visitors to have easier access to the distinctive features of the region.

Other existing charters include Norway, Honduras, Romania, the Cook Islands, California's Redwood Coast, Portugal's Douro Valley, Montreal, Greater Yellowstone, Baja California, Sierra Nevada, and Guatemala (Claude Joly, 2009; Dion *et al*., 2009; National Geographic, 2010; Sejvar *et al*., 2010). Honduras was the first country to make geotourism its national tourism strategy (National Geographic, 2005).

Nowadays, the Center for Sustainable Destinations (CSD) seeks to help individual places to use the geotourism approach to improve stewardship and attract the most beneficial and least disruptive forms of tourism. Regarding this, CSD works with a community-based local geotourism alliance to create a co-branded National Geographic map (geotourism map guides) that highlights the natural, historical, and cultural assets unique to a destination. Until 2010, CSD prepared the geotourism map guides for the North California Coast, Central Cascades, Montreal, Arizona/Sonora, Baja California, Crown of the Continent, Greater Yellowstone, Guatemala, Peru and Vermont.

Moreover, CSD launched geotourism projects in Romania, Norway, Rhode Island and Honduras to introduce geotourism opportunities in these territories.

Brozinski (2009) discussed the main difference between Popularization of Geology (PoG) and geotourism. Basically, the data in PoG and geotourism is the same, but PoG only goes as far as educating people about geology, while geotourism has an effect on the local economy.

Boley (2009) suggested a Geotourism Survey Instrument (GSI) to study the presence of geotravellers' behaviour in geotourism destinations such as the Crown of the Continent region of Montana, United States of America, and Canada. He focused on four measured dimensions of geotourism (culture-heritage, environment, aesthetics, and well-being of locals). It is worth mentioning that these dimensions were derived from the introduction to geotourism by National Geographic. A six-point scale was used to evaluate the geotravellers' behaviour in these territories. In this survey the mean scores ranged from 5.4 to 4.2, indicating a high agreement with the overall values of geotourism.

Nickerson (2010) used quantitative research methods for the study of tourist behaviour in Montana as a geotourism destination in the United States of America, to introduce geotourism as a basis for infrastructure planning in this territory.

In addition, Boyle and Nickerson (2010) used the Geotourism Survey Instrument (GSI) method in order to study demographics, geotraveller scores, and travel behaviour comparisons. Moreover, this study aimed to identify the important attributes for geotravellers, segmenting the geotravellers, and travel expenditures for geotravellers in Montana. 284 questionnaire forms filled in by vacation visitors were collected from 40 survey sites. On the basis of the results of this research, daily expenditures for the three distinct groups –strong geotraveller, moderate geotraveller and non-geotraveller – are differentiated. Strong geotravellers spent an average of 141.79 dollars more per day while the moderate geotraveller spent almost 134.10 dollars per day, and the non-geotraveler spent 109.15 dollars.

The geotourism definition by National Geographic and several studies related to this definition demonstrate the difference between the National Geographic Society definition and that of geoparks. The definition adopted by the National Geographic Society is now under discussion by the European Geoparks Network. In a geopark, geotourism must have a strong emphasis on geological heritage.

The following definition (Newsome and Dowling, 2010) is the most recent definition of geotourism which includes the wider aspects of tourist activity: "*Geotourism is a form of natural area tourism that specifically focuses on geology and landscape. It promotes tourism to geosites and the conservation of geodiversity and an understanding of earth sciences through appreciation and learning. This is achieved through independent visits to geological features, use of geo-trails and view points, guided tours, geo-activities and patronage of geosite visitor centres*".

According to Carvalho and Rodrigues (2010a), geotourism is not just organizing tourism in geoparks (Figure 2.7); it involves seven elements that must be always in close connection in a geopark, such as geological heritage, other heritage, tourist facilities, education, interpretation, geoconservation and local development, for tourism diversification of the territory.

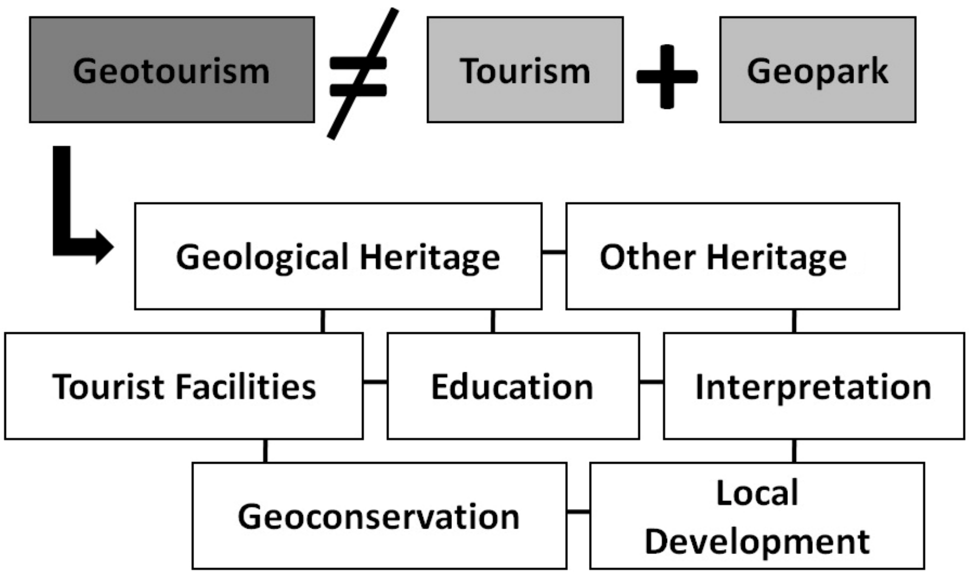


Figure 2.7- Geotourism-related elements for tourism diversification

(Source: Carvalho and Rodrigues, 2010a)

Gray (2008) believes that one of the most popular geotourism locations in the world is the Grand Canyon. The Grand Canyon applies to the diversity of the strata in the walls of the canyon in terms of rock colours and resistance to erosion, and the diversity of the slope morphologies and processes, besides the comprehensive geological history of the last 2000 million years that is enclosed in the rocks and landscape. Besides, many sports and leisure pursuits such as rock climbing also depend on geodiversity in this area.

Heggie (2009) pointed out that volcano tourism and travel to geothermal destinations are prominently under the umbrella of geotourism. In 2008, 2.3 million tourists visited the active volcanic features in the Hawaii, 4.2 million visited the geysers and hot springs of Yellowstone National Park and National Park in Arkansas, and 415,000 visited Oregon's Crater Lake National Park. The geothermal and volcanic activity at Rotorua, New Zealand, Mount Etna in Italy, Japan's Mount Fuji, Mount Tungurahua in Ecuador, Villarrica Volcano in Chile, the volcanic island of Sicily, like Stromboli, and

Iceland’s active volcanoes are other popular destinations for volcano tourists. In addition, local houses for rent to tourists in the Azores, “Volcano watching” for tourists visiting Hawaii Volcanoes National Park, Teide Volcanoes National Park and tourists visiting Mammoth Mountain, a dormant volcano and popular recreation destination in the United States, are further names in geotourism marketing.

Furthermore, Erfurt-Cooper and Cooper (2010) introduced volcano geothermal systems as sustainable geo-resources for leisure and recreation. They noted that active lava flows, Strombolian eruptions, geysers and hot springs, lava lakes, crater lakes, boiling ponds, fumaroles and vents, boiling mud pools, hot rivers and streams, and sinter terraces are ten top attractions in volcanic and geothermal destinations.

Thus, geological heritage sites can generate employment and new economic activities, especially in rural regions in need of new or additional sources of income (El Wartiti *et al*., 2009). In this regard, geological landscapes that draw visitors to Ireland and Britain support a thriving tourist industry. For instance, the Dinosaur Coast Project has marketed geology directly to tourists (McKeever *et al*., 2006). Moreover, Ireland ran a project supported by the local authorities, the Geological Survey of Ireland, the Geological Survey of Northern Ireland, and the University of Ulster, to discover the role of geotourism in supporting regeneration in disadvantaged rural communities in Ireland (O'Connor, 2008).

Tourism marketing in the Lake Constance region, which is situated in Germany, Switzerland, and Austria near the Alps, is in need of innovation to fulfil the increasing demand of tourists and consumers or customers in the long run. To this end, they have introduced geotourism as a successful marketing policy for developing the Lake Constance area (Gerner *et al*., 2009).

The development of the European Geoparks Network and the UNESCO Geoparks Program are providing models for engaging the public in the appreciation of geology that links sustainable economic development with the preservation and interpretation of geology (Miller, 2008). The geopark concept has been developed in recent years with the intention of promoting economic development through geotourism based on the geological resources of the territory (Gray, 2004, 2008). Fassoulas and Zouros (2010) noted that geoparks especially act for the benefit of local communities through the development of geotourism and educational activities in rural areas.

2.5. Geoparks: Concepts, Theories and Paradigms

Patzak and Eder (1998: 33-34) argued for the definition of a geopark as a territory comprising a number of protected geological heritage sites of special geological significance, rarity or beauty. These geological features are representative of a region and its geological history, events and processes. Comparable to a natural park, a geopark falls under the authority of the government in the country where it is situated. Geoparks are of particular value for education, science, culture and socioeconomic development (mainly through tourism). According to the EGN and UNESCO's recommendations, the criteria for the development of a geopark include (UNESCO, 2006b):

- **Size and setting**: a geopark candidate seeking network membership must have enough surface area in order to serve local economic and cultural development (mainly through tourism), including sites of ecological, archaeological, historical or cultural value.
- **Management and local involvement:** success in geopark management can only be achieved through strong local involvement. The initiative to create a geopark must come from local communities/authorities with a strong commitment to develop and implement a management plan that meets the economic needs of the local population, whilst protecting the (geological) landscape in which they live.
- **Economic development:** one of the main strategic objectives of a geopark is to stimulate economic activity and sustainable development. A geopark seeking UNESCO's assistance serves to foster socioeconomic development that is culturally and environmentally sustainable. This has a direct impact on the area involved by improving human living conditions and the rural environment.
- **Education:** a geopark must provide and organize support, tools and activities to communicate geo-scientific knowledge and environmental concepts to the public; all educational activities should reflect the ethical considerations around holistic environmental protection.
- **Protection and conservation:** a geopark contributes to the conservation of significant geological features.
- **Global Network:** The Global Network of National Geoparks provides a platform of cooperation and exchange between experts and practitioners in geological heritage matters.

The aforementioned criteria indicate that geoparks have three main targets: conservation, education and promoting local economy through geotourism. In order to achieve these goals, geoparks try to take advantage of network activities, the knowledge and workforce of locals.

Jones (2008) argued that the philosophy behind the geopark concept was first introduced at the Digne Convention in 1991.

The planned name “reserve” was changed to “geopark” based on the Decision of Earth Sciences of UNESCO in 1997. After that, the European Geoparks Network was established in 2000 as an international LEADER Program activity (Zouros and Martini, 2003). The European Geopark Network was set up by four regions of different European Countries — France, Germany, Spain and Greece — with similar natural and socioeconomic characteristics. These four regions are rural areas, with a particular geological heritage, natural beauty, and high cultural potential, all facing problems of slow economic development, unemployment, and a high level of emigration. Faced with these problems, the managing authorities of the geological parks and museums in these regions decided to strengthen their collaboration, and as a result the European Geoparks Network was established, although UNESCO gave no financial backing to the four countries (Zouros, 2004; Zouros, and Mckeever, 2009).

The main characteristic of the European Geoparks Network is that it works as a network of collaborating areas, rather than a list of members, as in UNESCO Programs. The network operates primarily by continuous electronic communication, frequent coordination meetings, and the establishment of common promotion tools and projects through which territories can exchange ideas, experiences, and best practices, thereby supporting each other to fulfil their common goals.

In 2001, the European Geoparks Network signed a formal agreement with the UNESCO Division of Earth Sciences whereby UNESCO gave the network its endorsement. During The First International Conference of Geoparks in Beijing (China, 27-29 June 2004), held by UNESCO, two main streams of activities were combined, and the UNESCO-assisted Global Geoparks Network was set up (EGN, 2007). The aim of this network is to provide a platform of cooperation and exchange between experts and practitioners in geological heritage matters under the umbrella of UNESCO.

The objective of the World Heritage Convention is to recognize natural and cultural sites of "outstanding universal value” (Eder and Patzak, 2004). The geopark as a “*Geological heritage scenic spot of special geoscientific significance, rare natural attributes and aestheti-*

cally ornamental value and with given scale and distribution scope, which integrates other natural scenes and sights and that of cultural interest into a unique natural area. It is not only a site for travel and sightseeing, vacationing and health recuperation as well as cultural recreation at a relatively high scientific level, but also a key protected area of geological heritage and base for geoscientific research and popularization" (Chen and Jiang, 2003). A geopark contains a number of geological heritage sites of particular importance, rarity, or aesthetic appeal. These earth heritage sites are part of an integrated concept of protection, education, and sustainable development. A geopark achieves its goals through a three-pronged approach: conservation, education, and geotourism (UNESCO, 2006a). UNESCO introduced the geopark as a geographical area, but geoparks should include not only sites of geological significance, but also sites of ecological, archaeological, historical, or cultural value. In many societies, natural, cultural, and social heritage are inextricably linked and, thus, cannot be separated (UNESCO, 2007).

In 2004, the agreement between the UNESCO Division of Earth Sciences and the EGN was confirmed by the Madonie Declaration (Italy, October 2004). A presentation of the declaration is necessary as it uses European geoparks as a model for the rest of the continental networks to develop and form the GGN supported by UNESCO (UNESCO, 2006a; Frey *et al*., 2006). Aside from EGN and GGN, there is also IAGT (the International Association for Geotourism) established in Krakow, Poland in 2007, in order to facilitate information exchange, business, research and teaching partnerships and other collaborative activities among its members (http://www.iageotour.com/; Newsome et al., 2011).

UNESCO supports national geoparks which are potential candidates for incorporation into the gradually expanding world network (Alexandrowicz, 2006). Since the establishment of the European Geoparks Network the protection of geological heritage and the promotion of sustainable development have been the main objectives of each geopark (EGN, 2007). The UNESCO geopark list shows that the numbers of geoparks are increasing very fast (Table 2.5 and Figure 2.8). At the end of 2011, there were 87 geoparks in 27 countries, which had been registered with the GGN, and China with 26 geoparks is the world's leading country (Newsome et al., 2012).

Nowadays, at the European level, the LEADER and INTERREG IV projects support initiatives in the field of the development of geotourism, particularly within geoparks.

For exchange of knowledge, the Global Geoparks Network held international conferences with geopark and geotourism themes. The First International Geoparks Conference took place in June 2004 in Beijing with over 300 people from 40 countries. The Second Global Geoparks Conference was held in Belfast, Northern Ireland, in September 2006, with 320 participants from 40 countries and 6 continents. The Third Global Geoparks Conference was in Osnabruck (Germany) in June 2008, with around 500 participants from 60 countries. The 4th International UNESCO Conference on Geoparks was held in Southeast Asia, Langkawi Global Geopark (Malaysia) in 2010. The conference was attended by 427 people from 27 countries, with the biggest contingent from China.

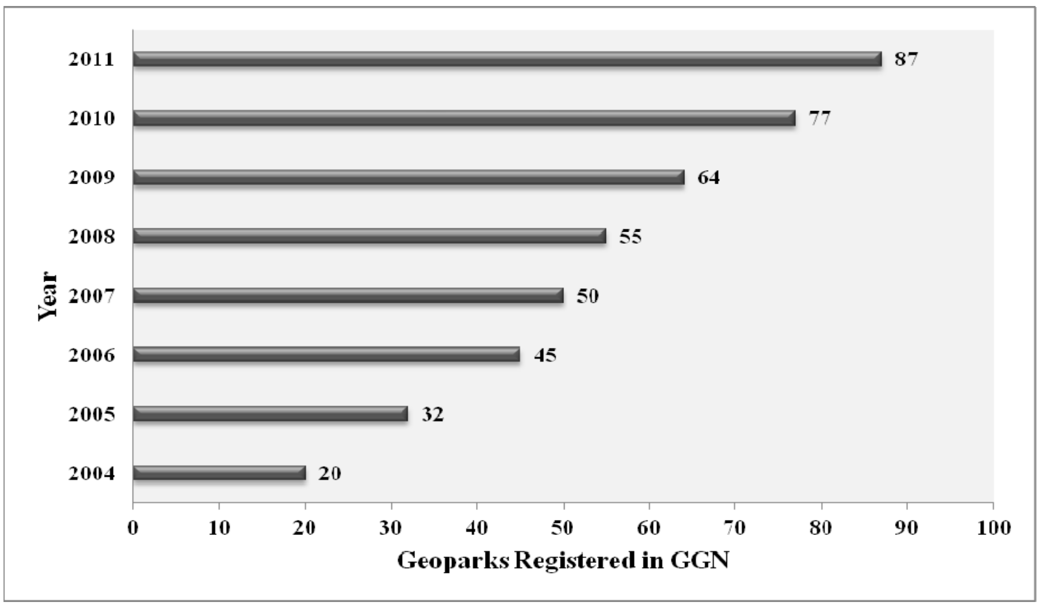


Figure 2.8 - Geoparks registered in GGN from 2004 to 2011
(updated by http://www.earthwords.fsnet.co.uk/geopark.htm)

Table 2.5- Registered geoparks in GGN

(Source: www.unesco.org/science/earth/doc/geopark/list.pdf)

Country name / year	2004	2005	2006	2007	2008	2009	2010	2011
Australia	0	0	0	0	1	1	1	1
Austria	1	1	1	1	1	1	1	1
Brazil	0	0	1	1	1	1	1	1
China	8	12	18	18	20	22	24	26
Croatia	0	0	0	1	1	1	1	1
Czech Republic	0	1	1	1	1	1	1	1
France	1	2	2	2	2	2	2	3
Germany	3	5	5	5	5	5	5	5
Greece	2	2	2	2	2	3	4	4
Iran	0	0	1	1	1	1	1	1
Ireland	1	1	1	1	1	1	1	2
Italy	1	2	2	3	5	5	7	8
Malaysia	0	0	0	1	1	1	1	1
Norway	0	0	1	1	1	1	2	2
Portugal	0	0	1	1	1	2	2	2
Romania	0	1	1	1	1	1	1	1
Spain	1	1	4	4	4	4	5	7
United Kingdom	2	4	4	6	6	8	8	8
Japan	0	0	0	0	0	3	4	5
Hungary-Slovakia	0	0	0	0	0	0	1	1
Canada	0	0	0	0	0	0	1	1
Korea	0	0	0	0	0	0	1	1
Vietnam	0	0	0	0	0	0	1	1
Finland	0	0	0	0	0	0	1	1
Germany-Poland	0	0	0	0	0	0	0	1
Iceland	0	0	0	0	0	0	0	1
European Geoparks	12	20	25	29	31	35	42	49
Total Number of Geoparks	20	32	45	50	55	64	77	87

The idea of a geopark is originally closely related to the pedagogical, tourism, and geological scientific interest of sites (Figure 2.9). However, the term “GEO” is more than geology; it involves geographical (both physical and human) and geomorphological earth systems.

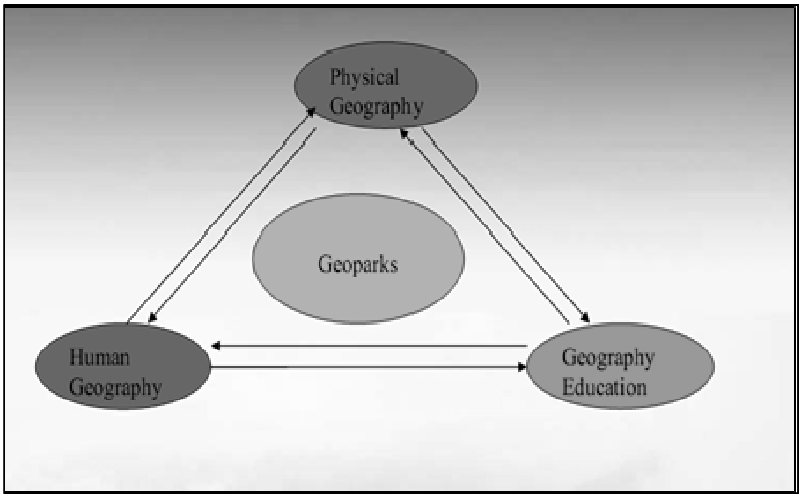


Figure 2.9- Relation between geopark and geography (Source: IGU, 2008)

With regard to this, at the end of 2007, the International Geographical Union Executive Committee decided to launch the Commission on geoparks and continue the work of the geopark task force.

The commission took two years (2008–2009) to develop its research programs and establish a methodological framework to analyse issues of geoparks, including relationships with associated institutions and International Geographical Union (IGU) Commissions; from 2010 to 2012 it is focusing on the development of comparative studies on geoparks, tourism, and corresponding social, economic, environmental, and political change (IGU, 2008).

The general goal of geoparks is to integrate the preservation of geological heritage into a strategy for regional sustainable economic and cultural development (Eder, 2008). Therefore, geoparks stimulate the creation of innovative local enterprises – small business, cottage industries, and new jobs – and generate new sources of revenue stemming from geotourism and geo-products. When geotourists move to geoparks, the money follows the same path, as if geoparks were exporting something such as agricultural and local products to other places. Geoparks have to support the establishment of local crafts and replicas, as well as supporting local products. Thus, visitors to geoparks can actually take away with them, together with emotions and knowledge, manufactured goods (Frey, *et al*. 2006).

Geotourism has created opportunities for new initiatives in Forest Fawr Geopark (Wales). Forest Fawr opened the door of geoparks to geotourism activities such as walking, cycling, introducing courses on geology, organizing research projects and exhibitions, and providing educational packages for schools, to attract more lucrative European funding for the geopark territory (Penn, 2006). Furthermore, Partin *et al*. (2006) illustrated that the park managers of the Stone Forest Geopark (China) reported that the villagers in areas bordering the park and those involved in tourism have three times the income of other regional villagers. The quality of housing in villages adjacent to the park was notably higher than that in villages where tourism did not constitute a large proportion of the local economy. Moreover, national geoparks in China brought favourable social, cultural, economical and environmental benefits (Xun and Ting, 2003). Another example in this regard is the Jinhu National Geopark in Taining County, Fujian Province (China) established in 2000. The related tourism projects attract a great number of visitors. In 2001, the total revenues from tourism reached 202 million Yuan, 35.7% over the previous year, accounting for 13.5% of the county's GDP (Xun and Ting 2003). Revenues from tourism-related tertiary industry increased to 450 million Yuan, up 12.3% compared with the previous year and accounting for nearly 30% of the county's GDP. Thus, tourism has become a pillar industry of the county. It has brought such trades as catering, transportation and cultural recreation, providing employment for about 2,800 people (Xun and Ting, 2003). Furthermore, in collaboration with nine agro-tourist women's cooperatives, the Museum of Lesvos Petrified Forest European Geopark (Greece) has established an agro-tourist festival during the summer period in order to promote the quality of local products, food and drinks prepared using old recipes by the women of the villages in the geopark area (Zouros, 2004).

McKeever *et al*. (2010: 225) described the creation of the Petrified Forest of Lesvos European Geopark as having transformed western Lesvos, attracting 90,000 visitors annually and employing 35 directly and hundreds of new jobs having been created indirectly. The geopark is now the island's main visitor attraction and is an excellent example of how the holistic approach to conservation used in geoparks can be successful from the perspective of the local community.

Since the geopark is a new concept, geopark activities have not been deeply studied yet. Based on the literature review, Fang *et al*. (2007) analysed and discussed the spatial hierarchy structure and system conception model of geoparks, and classified geopark information systems into subsystems, such as geological relic survey and appraisal subsystem, geological relic protection, tourism exploitation, science popularization and teaching, geopark planning, geological environment, multimedia, map editing subsystem, and so on.

With the rapid development of geoparks and e-tourism, the internet plays a significant role in promoting and distributing geopark services. Regarding this, Yan *et al*. (2008) examined the performance of the e-business system of geoparks in China and provided a comprehensive assessment of e-business functions of geoparks in China.

2.6. Comparison between Geoparks and Protected Natural Areas

Farsani *et al*., (2011a) discussed the comparison between geoparks and protected natural areas.

The concept of protected area dates back to 1872 when the first modern protected area (Yellowstone National Park) was established in the USA. This accompanied the formal laws which forced indigenous Indians to leave their territory. This management structure of protected areas was followed by many countries (Langton *et al*., 2005).

It is noteworthy that attention to the rights of local communities in management of protected areas is relatively recent. In the 19th and 20th centuries, many protected areas were established on land and resources held as common property by communities, but perceived as terra nullius (no man's land) when it came to seeking permission and offering compensation. The resident people were often expelled or severely restricted in terms of permissible uses of natural resources, often without compensation. Today, few people argue against the need to engage resident or neighbouring communities positively in the management of protected areas, and probably no one would defend the proposition that human rights are less important in relation to protected areas than elsewhere. Moreover, around the world, conservation agencies and communities are also "learning by doing" in an enormous variety of specific situations, trying to understand and apply an evolving body of international and national laws and regulations on the rights of indigenous people and local communities. The specific concerns about the rights of indigenous people have emerged as part of this evolving body of human rights. Thus the ILO Convention No. 169 Concerning Indigenous and Tribal People in Independent Countries, adopted in 1989 defines indigenous people and recognizes their right to have their social, cultural, religious, and spiritual values and practices recognized and protected, and the right to define their development priorities (Borrini-Feyerabend *et al*., 2004). According to Agenda 21, the knowledge and traditional way of life of the local, rural communities play a vital role in environmental management. States are encouraged to support the identity and culture of communities and to enable their effective participation in the achievement of sustainable development (Brecon Beacons National Park Authority, 2007).

At present, UNESCO's declaration on geoparks as a model of sustainable development and protection of nature has highly developed the strategy of local communities' participation in protected and natural areas. The UNESCO definition demonstrates that geoparks embrace some registered National Parks and protected areas with unique geological and cultural heritage sites. For instance, Cabo de Gata Natural Park (Spain) had been a protected area since 1987 and classified by UNESCO as a Biosphere Reserve, when in 2006 it was accepted as a member of the European and Global Geoparks Network (EGN).

Nowlan (2010) noted that a geopark is not a new form of land ownership. The designation of the land area as a geopark does not affect the legal status of a property and the federal, provincial, territorial, municipal and first nation laws remain applicable to ownership and management of the sites. UNESCO has no legal rights over local, provincial, territorial, federal, aboriginal, or private ownership or management of geopark territory. On the other hand all geoparks are under the umbrella of UNESCO which supports and internationally unifies the Global Geoparks Network (GGN); for example UNESCO organizes and coordinates the conferences, and supervises application procedures and standards, and produces publications on geoparks and geotourism topics.

The natural heritage and monuments which include the criteria of UNESCO can be applied to Global Geoparks Network membership (Table 2.6).

It is stated that a geopark should aim for the development of the local territory and support local communities and products. Local communities should not be removed from the lands where they live, since the locals' knowledge, traditional arts and traditional style of life can play a vital role in geopark management. Geoparks are established at an international level but are managed at a local level; a geopark encourages the local communities to follow cultural interchange and identity preservation. It also motivates local people to effectively participate in achieving sustainable development and sustainable tourism. Moreover, a geopark leads to the stimulation of the local economy through geotourism and conservation activities. Sustainable socioeconomic development is encouraged in geoparks and is considered in the way the park is developed (Nowlan *et al.*, 2004). Managers of geoparks try to improve the welfare of indigenous communities through innovative activities and consulting with local businesses, artists, tour operators, private sectors, accommodation facilities, restaurants, and producers. Besides this, they involve locals in conservation and educational activities and imparting of indigenous knowledge and art.

Table 2.6 - Parks and protected area may be included within geopark's boundaries

Classification of protected area		
National Parks	Natural Park	Nature reserved
Provincial Park	Municipal or Regional lands/Parks	Protected landscapes
Territorial Parks	Aboriginal lands	Site of biological interest
Reserved area	Natural monuments	Trails (geological, ecological and cul-tural)
Protected areas	Provincial, territorial, local, and private conservation land	Private lands that offer public access

Transferring geoparks from the regional to a European and Global scale gives the geopark a special value (Frey *et al*., 2006).

The Global Network of National Geoparks operates in close synergy with UNESCO's World Heritage Centre, the Man and the Biosphere (MAB), World Network of Biosphere Reserves, national and international undertakings and non-governmental organizations active in geological heritage conservation. For some national geoparks in Europe, a privileged partnership has been established with the European Geoparks Network. National parks have been defined by the International Union for Conservation of Nature (IUCN), and World Commission on Protected Areas.

McKeever and Zouros (2010) discussed that the structure of the European Geoparks Network comprises an Advisory Committee (11 members including representatives of UNESCO, the International Union of Geological Sciences (IUGS), and the IUCN) and a Coordination Committee (comprising two representatives from each geopark member). Decisions concerning the network are only taken by the Coordination Committee.

However, some countries, such as China, Germany and Japan, have developed national geopark networks to create close collaboration between geoparks, NGOs (non-governmental organizations), tourism sectors, schools, universities, and businesses. Thus, the domestic network or forum not only provides an opportunity for the exchange of knowledge but also encourages local communities and local private sectors in geopark activities.

It can be said that the geopark is a fully-fledged protected area that, on the one hand, involves local communities in conservation activities of natural heritage and takes advantage of their indigenous knowledge and, on the other hand, strives to improve the local economy through geotourism. The core difference is actually that in a protected natural area in most countries and, at least in certain zones, no human and/or development activities are allowed to take place due to a very strict protection status.

Another difference between geoparks and protected areas is that geoparks are commonly created and managed by local communities while protected areas are usually part of national organizations of natural heritage conservation. The last but not the least difference between geoparks and protected natural areas is the emphasis of the geopark on geological heritage and its introduction as tourist attractions in addition to ecological, cultural, historical, and archaeological aspects.

2.7. Steps and Guidelines for Becoming a Global Geopark Network Member

According to UNESCO Global Geoparks Network Guidelines (2010), size and setting is the first criterion for becoming a geopark. A geopark should include an area with clearly defined boundaries and a large enough area for it to develop the local economy and cultural sustainability, particularly through tourism in the form of geotourism. Usually, geopark territory encompasses geosites and eco-sites with international, national and regional importance.

Since education and public awareness is a target of geopark establishment, the geosites and eco-sites located in the geopark should be important from the point of view of science, rarity, education and aesthetics.

A geopark involves ecological, archaeological, historical and cultural values. Both tangible and non-tangible heritage are important parameters for the establishment of geoparks. Spiritual culture includes components such as: languages, food, music, dance, traditional practices and ways of living, etc., and these are examples of non-tangible heritage.

It is noteworthy that a geopark may be situated in the territory of more than one country. Novohrad-Nogad Geopark – a member of European Geoparks Network and Global Geoparks Network – is located in the territory of two countries (Hungary and Slovakia).

The second criterion for becoming a geopark is contribution in management and local involvement. Establishment of an effective management system and program of implementation is a prerequisite for geopark creation. It is evident that geosites and eco-sites should be accessible to visitors and should provide tourists with satisfaction. Moreover, for better management of the geopark, the authorities should involve local communities, the private sector and both researchers and educational bodies in the design and running of the geopark. Thus a geopark must encourage partnerships in its territory.

Development of the local economy is the third criterion for becoming a geopark. The main objective of a geopark is to stimulate the local economy within the framework of sustainable development. Stimulating the local economy through tourism marketing is an important goal of a geopark. Examples can include: wine tours related to geology, soil, and topography; historic mining operations (even active mines) – such as the Geological and Mining Park of Sardinia (Italy) – or sightseeing and photography tours. Regardless of the development of the local economy, a geopark should play an important role in sociocultural sustainability; often cultural heritage is linked to geological heritage through innovative strategies in geoparks. Making geo-products – local products which are symbols and communication disclosers of geoheritage – constitute a good example.

In many cases, local communities have a special cultural connection to specific features in the landscape of the geopark. One remarkable example is the architecture of the houses in the Monsanto village in Naturtejo Geopark (Portugal) integrated between granite boulders which are the symbol of this secular culture.

The creation of innovative local enterprises, such as opening geo-bakeries and geo-restaurants, small businesses, cottage industries, the organization of high quality training courses, and the appearance of new job opportunities and new sources of revenue through geotourism, geo-products and geoconservation (encouraging casting instead of the sale of fossils, for example) are benefits which emerge through the establishment of geoparks. These activities can provide supplementary incomes for local communities and can engage locals in geotourism marketing as a new business sector involving strong multidisciplinary cooperation.

The fourth criterion for becoming a geopark is organizing educational activities. A geopark should transfer knowledge and information within the community. Regarding this, it must provide and support tools and activities to communicate geo-scientific knowledge and environmental and cultural concepts to the public (e.g. through geopark museums, theme museums, geotourist maps, interpretative panels, educational centres, geo and cultural trails, guided geotours, and modern communication media). A geopark should run educational programs for universities and schools.

Protection and conservation activity is another criterion for becoming a geopark: it should try to explore and demonstrate methods and best practice in conservation of geological heritage. Likewise, a geopark must not participate in the direct sale of rocks and geological objects (Nowlan, 2010). A geopark not only preserves natural heritage but also strives to preserve the cultural heritage; holding regional festivals and organizing exhibitions for local products and handicrafts are strategies for reviving traditional culture.

Finally, if a geopark has the above-mentioned criteria, and a fully operational and dedicated body, it can apply for membership of the Global Geoparks Network. The steps for registration in UNESCO Global Geoparks Network are summarized in Figure 2.10.

In the first step, the geopark authorities should submit an application dossier of the proposed geopark to the Geoparks Secretariat at UNESCO; the application should be submitted electronically.

After that, the Geoparks Secretariat shall verify the documents. Applications must be submitted between 1 October and 1 December every year and they will be verified between 1 January and 30 April. Subsequently, in order to carry out the evaluation, experts who will compile a report for submission to the GGN Bureau contact the proposed geopark and agree on a mission program. According to Global Geoparks Network guidelines, the costs of travel, accommodation and transportation of the experts should normally be paid for by the country or territory where the geopark is located.

Obviously, if there is a National Network or Forum for geoparks in a country such as China, Japan, Germany, Italy, Ireland or Greece, the applicant must first become a certified member of that national network, or ask for advice, before submitting its dossier for membership to the GGN. Similarly, European geoparks should first become a member of the European Geoparks Network.

When a geopark is registered in the UNESCO Global Geoparks Network, membership is limited to a period of 4 years, after which time it can be renewed following the same procedure. The authorities should fill in the revalidation form and a visit by two evaluators will be organized.

After revalidation one of three results will be announced. A Green Card certifies continuing membership of the geopark in the network for a further 4 years. A Yellow Card will be issued if the geopark activities and documents are not sufficient, and if the geopark is inactive it will be removed from the Network and a Red Card will be issued (Zouros and Mckeever, 2009). Any geopark that loses Global Geoparks Network membership can submit a new application dossier after solving the major deficiencies that led to the Red Card.

Clearly, The UNESCO Global Geoparks Network (GGN) members can take advantage of GGN Logo and exchange of knowledge in Network activity.

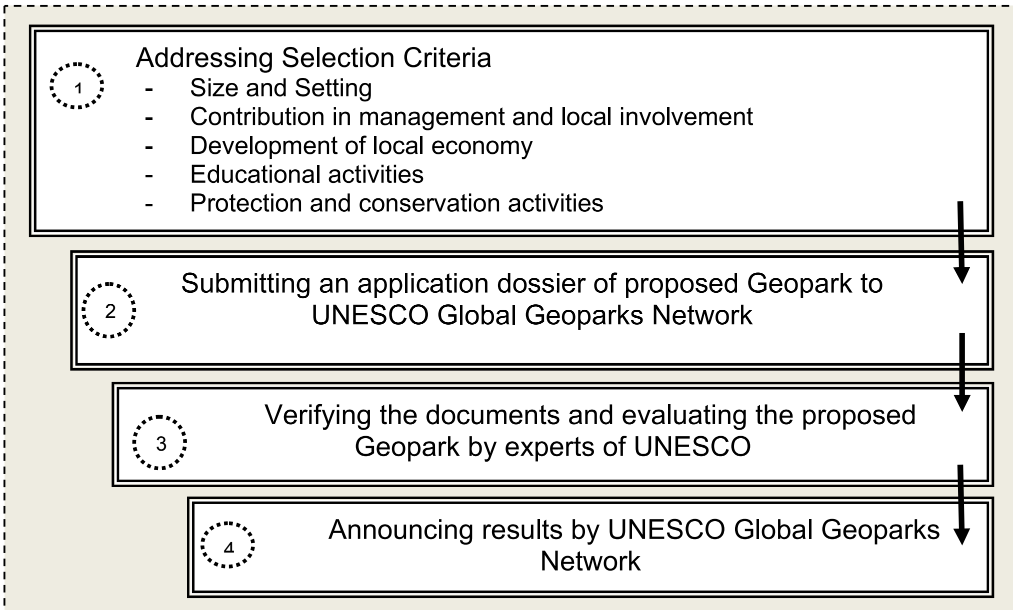


Figure 2.10 - Steps for registration a geopark in Global Geoparks Network
(Source: own construction)

2.8. Geo-products in Geotourism Destinations such as Geoparks

Middleton (1989) stated that the tourism product includes all the service elements a visitor consumes from the time that he leaves home to the time of return. This product can be an idea, an expectation, or a mental construct in the customer's mind, at the point of sale. Middleton (1989) believes that the concept of a tourist product is relevant both to destination interests, such as National Tourist Offices and Regional Tourist Offices, and to the suppliers of individual component services, such as accommodation and attractions.

With the emergence of geotourism as a new branch of sustainable tourism, tourism products have entered a new phase. Since geotourism is a new niche market, on one hand, it should introduce its attractions and its targets to visitors and on the other hand it should set up novel strategies to meet the challenge of attracting more tourists to geotourism destinations. In this regard geotourism destinations such as geoparks strive to apply innovation in tourist products.

These tourist products should not only follow sustainability principles, but should also promote and develop geotourism as a new branch of tourism.

As geosites (geological and geomorphological heritage sites) are the main attractions of geotourism destinations (such as geoparks), demonstration of pedagogical tools for geotourism and educational activities can be a strategy for the preservation of geoheritage sites and minimizing negative impacts of tourism on these sites.

According to Reynard (2008), geotourism offer or geotourism products/services can be classified into two categories: original offer and derived offer (Figure 2.11). The original offer consists of the set of geosites (e.g., an occurrence of dinosaur tracks, paleontological sites, landforms, mineral water springs etc.), while the equipment developed for the accommodation and transportation of tourists, the specific derived scientific goods (books and other written documents, digital documents, games and souvenirs) that facilitate the comprehension of the geoheritage by the tourists, the interpretation services at the disposal of tourists in the area (museums, visitor centers, exhibitions, guided tours, interpretative panels), as well as outside the region (websites) are categorized as derived geotourism offer or products/services.

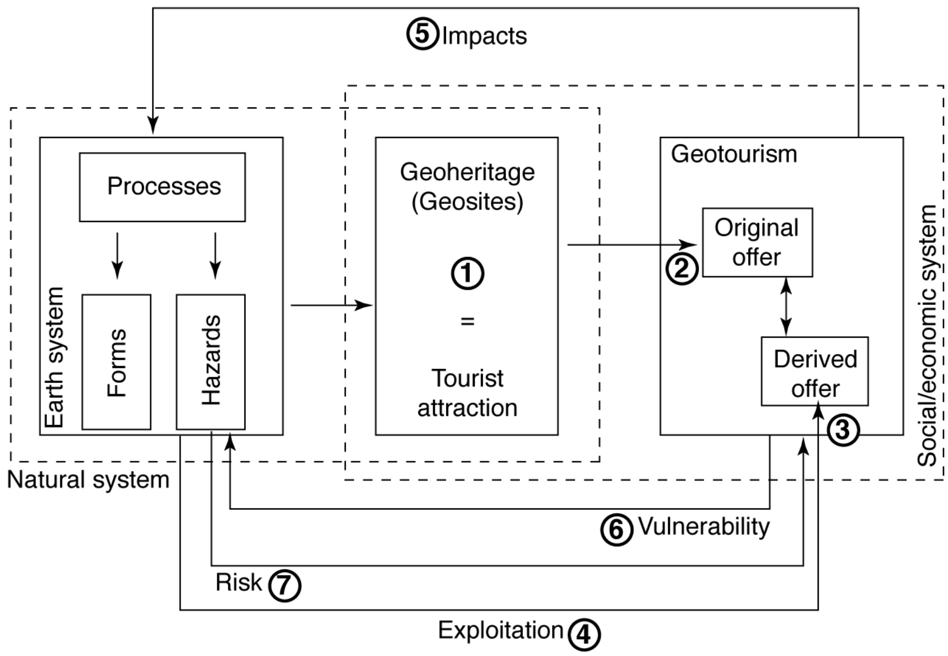


Figure 2.11- Conceptual model of geotourism and its relationships with geo-heritage (Source: Pralong and Reynard, 2005)

This section focuses on the introduction of derived geotourism products named geo-products. According to UNESCO (1999), geo-products are "the sustainable manufacturing of innovative handicrafts which have a geological connotation". Geo-products are new orientations in trades and crafts (Xun and Milly, 2002). Eder and Patzak (2004) introduced geotourism and geo-products as new sources of revenue which can provide supplementary income for the local population and attract private capital. Frey *et al*. (2006) noted that geo-products are pedagogical tools for environmental education, training, and interdisciplinary research related to geoscientific disciplines, broader environmental issues, and sustainable development. According to UNESCO Global Geoparks Network Guidelines (2010) geo-products are tools for protecting the geo-resources of the geopark (e.g. encouraging locals to make casts of the fossils instead of selling them). Geo-products try to integrate traditional products with new concepts and interpretations; they also raise awareness of geodiversity. Geo-products provide new experiences for geotourists and strive to develop the local economy (Rodrigues and Carvalho, 2009). Compľová (2010) identified geo-products as geological attractions such as geosites, geoheritage, etc. He indicated that geo-products can involve human products related to the cultural patterns and architecture of the geotourism destinations.

Making geo-products can be a solution to promote the local economy and local products in geotourism destinations, especially geopark territories (Farsani *et al*., 2011a).

The above definitions illustrate that each geotourism destination, when making geo-products should pay particular attention to the following principles (Farsani *et al*., 2012a):

- geo-products should be made of local or regional products;
- geo-products should be a symbol of the geological or geomorphological heritage of that territory;
- geo-products should be commercial and pedagogical tools;
- geo-products should integrate local and traditional products with concepts and interpretations in geosciences;
- geo-products should be earth friendly (sustainable) products;

Making geo-products is an innovative strategy, and has been applied by some geoparks, family businesses, restaurants, bakeries, and local businesses for education and development of the local economy through geotourism.

The Junior Geo company can be seen as a good example for making geo-products. Junior Geo is a family-run business based in Dorset (UK), which was set up in August 2005. The Junior Geo company tries to organize field trips (fossil hunting trips on the SW Coast of England) for schoolchildren, as well as working hard on combining the wonders of the natural world and modern design to create something that looks really fabulous. The Junior Geo company created the Rock Shop for school fairs in 2005, and established an online store that provides all things fossil and mineral for kids (Verkaik *et al*., 2005). Customers can buy online milk chocolate ammonites, milk chocolate trilobites, chocolate dinosaur shapes, chocolate fossil shells, etc.

As mentioned before, geoparks are pioneers in the promotion of geotourism, and authorities of geoparks through consulting with local businesspeople, restaurants, bakeries, museums, outdoor companies, rural hotels, and family guest houses attempt to develop geo-products in these territories. It is worth mentioning that geo-products which are made based on geological elements of geoparks not only introduce local products and local handicrafts to visitors, but increase public awareness and knowledge of visitors about the geology and geomorphology of that territory. Therefore it can be said that geo-products are pedagogic tools in geoparks.

Apart from the above, there are geotourism maps, geotours, geo-museums, thematic museums, interpretative panels, publications, geotourism handbooks, geotourism guide books, and geotourism calendars. Geoparks applied innovation in decorative or ornamental products, and edible products for introducing geoheritage sites. Therefore, geo-products in geoparks can be classified into two categories: decorative or ornamental geo-products, and edible geo-products.

Decorative, ornamental and commemorative goods made from stone or wood, furniture, children's toys, and clothes which are symbols of the geopark can be a geo-product. In geopark territory local handicrafts can be converted to decorative or ornamental geo-products. These kinds of geo-products can not only preserve handicrafts as a cultural component and develop the local economy, but also present the geological heritage of the geopark to visitors, local communities, and children including schoolchildren.

Making trilobite clocks, trilobite lamp shades, printed glass with trilobite pictures, trilobite necklaces, etc. in Arouca Geopark (Portugal) can be a good example of decorative or ornamental geo-products (Farsani *et al*., 2012a). It is noteworthy that one of the most important geosites in Arouca Geopark is an outstanding fossil locality of the Darriwilian (Middle Ordovician) age, where giant trilobites and trilobite clusters (from several to thousands of specimens) occur in large slabs of shale (GTGA, 2006; Coelho, *et al*., 2010).

Pedras Parideiras is another geo-product in the Arouca Geopark. Pedras Parideiras are cookies which have the shape of biotite nodules from local granites. Visitors can find these cookies in one of the famous pastry shops of Arouca (*Casa do Pão de Ló de Arouca*). *Pedras Parideiras* is a symbol of the *Castanheira* Nodular Granite, with a phenomenon popularly known as *Pedras Parideiras* (rocks that give birth) (Farsani *et al*., 2012a).

Naturtejo Geopark (Portugal) is another active geopark in making geo-products. The establishment of a geo-restaurant and geo-bakery in Naturtejo Geopark were strategies to create geo-products. They draw inspiration from the landscape and have revived past civilizations and ancient traditions as well (Rodrigues and Carvalho 2009; Naturtejo Geopark Authorities, 2010a)

The geo-bakery (*Casa do Forno*) is managed by a geologist couple. Geology stimulates the couple participating in management; for instance they make trilobite and granulite cookies in the geo-bakery, and they serve them in tours, conferences, and for the local guests.

Besides this, the geo-bakery has designed a geo-menu and serves geo-food. Each pizza in this restaurant has a geographic name, for example Nazca Pizza (an example of a tectonic earth plate). Aside from tectonic pizza, the geo-bakery makes Orogenic Toasties (Cadomian, Variscan and Alpine, representing the major mountain belt events from Naturtejo Geopark) (Geraldes and Ferreira, 2009).

Serving ‘Boulder Soup’ or ‘Marble Cake’ in the *Petiscos & Granitos* geo-restaurant which is located in the Monsanto village, Naturtejo Geopark (Portugal) constitutes another good example for making geo-products. *Petiscos & Granitos* is the first geological restaurant which is located in the Naturtejo Geopark territory. The food is served on tables set among boulders (the geological architecture of the restaurant) (Rodrigues and Carvalho 2009; Farsani et al, 2010).

Furthermore, *Carlos Santos*, a businessman from Idanha-a-Nova has inaugurated the second geo-restaurant in Naturtejo Geopark. The *Carlos Santos Sabores da Terra* (Earth Flavours) geo-restaurant serves traditional recipes combined with local products such as local mushrooms, cheese and olive oil. In addition, geo-food such as *Cantchais Lamb* (*Cantchais* is the local name for granite boulders) is served in this geo-restaurant. The menu of the restaurant is related to local geological landscapes (Naturtejo Geopark Authorities, 2010a).

Vulkaneifel Geopark (Germany) became economically famous for its mineral water resources. Today, many volcanologists and geologists as well as environmental scientists and biologists do research here because of the large open pits which give a new dimension to look into volcanological processes and perspectives for sustainable development ideas. Creating geo-cocktails such as Vulkaneifel Mineral Water Cocktails is an innovation for promoting regional and local products in this geopark (Farsani *et al*., 2010).

As for geology, Hateg Country Dinosaurs Geopark (Romania) is known worldwide for its "dwarf dinosaurs" from the end of the Cretaceous, 65 million years ago, and this special paleontological heritage has inspired the name of the geopark. The authorities of this geopark, through making geo-products such as dinosaur bread, promote geosciences as well as the local economy (Farsani *et al*., 2012a).

Furthermore, Réserve Géologique de Haute Provence (France) offers ammonite chocolate, ammonite bread, and pastries, as some of the attractions in Digne les Bains (Unjah, 2008).

Consequently, it can be said that geo-products *as pedagogic tools are sustainable and earth friendly products which can integrate geoheritage (geological, geomorphological and geographical) with cultural components. Thus, making geo-products is an innovative strategy to identify geoheritage as a new tourist attraction. Promoting geo-products can be a way to develop the local economy* (Farsani *et al*., 2012a; 2011b)

It should be noted that a geopark is an area for introducing and protecting the geological and geomorphological heritage, such as its cultural, ecological, archaeological and natural resources, as tourist attractions; the establishment of a geopark can be a strategy for sustainable economical development. Therefore, marketing in geoparks should not only pay particular care and attention to geo-products and geotourism marketing, but also help to draw attention to local marketing such as local products, agricultural products, handicrafts based on natural heritage (fauna and flora), regional festivals, national festivals, cultural festivals, etc.

As mentioned before, local companies, bakeries, restaurants, outdoor companies, and family businesses are active in creating geo-products.

It is noteworthy that the private sector or family businesses only undertake innovation such as creating new products when an organization promises them to be profitable.

Branding (certification) of local products will support the local producer. Local producers and customers will benefit from branding advantages which are higher-quality, environmentally friendly and so on.

Regarding this, the UNESCO Global Geoparks Network provides opportunities and possibilities, through a common logo, for small firms which are the members of the Geopark Network to boost their creativity and initiatives (Zouros and Mckeever, 2009). These logos must only be used on products produced directly by geoparks and related to geopark activities (such as geo-products, publications, fairs, regional festivals, exhibitions, etc.).

2.9. Socio-Cultural Sustainability in Geoparks

The New Dictionary of Cultural Literacy (Hirsch *et al*., 2005) defines culture as “the sum of attitudes, customs, and beliefs that distinguishes one group of people from another. Culture is transmitted through language, material objects, ritual, institutions, and art, from one generation to the next” (Hirsch *et al*., 2005). According to Barbic (1998), cultural identity and its components are changing over time even though, when these components are known as traditions, it persists for a longer time.

Cultural identity is classified into two groups: material culture and spiritual culture. According to Le Ha (2008) material culture is always changing, while spiritual culture is more stable. Spiritual culture includes components such as languages, handicrafts, food, music, dance, etc., and material culture involves landscapes such as architecture and urbanism, crops, etc. (Figure 2.12).

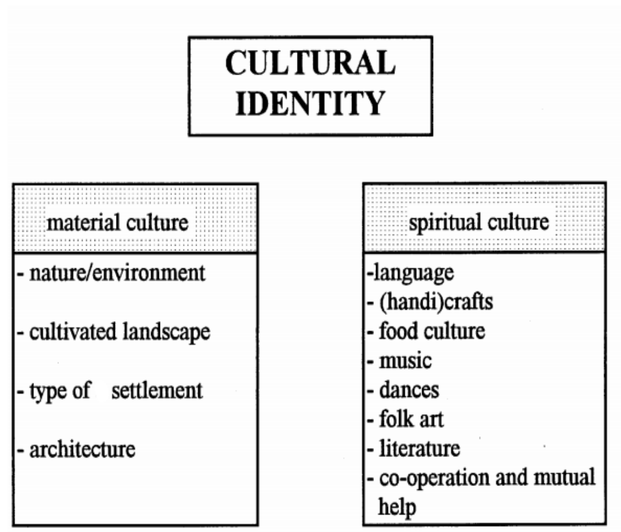


Figure 2.12 - Cultural identities (Source: Barbic, 1998)

The aim of this section is to identify the role played by geoparks and geotourism in cultural sustainability. For this purpose, a brief literature review addresses the negative and positive impacts of tourists on the sociocultural identity of host communities. Furthermore, a literature review was conducted to find out which activities are applied by geoparks in order to preserve cultural components of local communities who live in geopark territories.

Discussion of tourism’s social and cultural impacts on host communities was presented in America with the publication of Hosts and Guests in 1977 (Smith, 1989a). Running throughout the book is the theme that tourism has consequences for the host society, sometimes good and sometimes bad.

Mansperger (1995) found that tourism in Kenya has encouraged undesirable behaviours among residents such as begging and prostitution. Importantly, he noted that this behaviour is reduced in communities with strong native institutions. Brunt and Courtney (1999) offered an excellent review of this literature. The literature mentioned identified the key social impacts of tourism development, such as: the concentration of power among elites; the loss of local decision-making power; the erosion of gender segregation and increased opportunities for women; and a shift in demographics bringing young transients looking for jobs, dependency, and over-crowding. They also found that the key social impacts of tourist-host interaction have been identified as: changes in perceived safety and security; a worsening attitude towards tourists; the imitation of perceived tourist lifestyles; introduction of new languages; the demise of local languages; conflict; avoidance of tourist areas, resentment due to economic inequality; and resentment over inflated prices.

Lastly, it was found that the key cultural impacts of tourism are: commoditization of culture; revitalization of culture; acculturation; destruction of culture; and temporary change in host behaviour. These impacts are quite varied and reported from studies all over the world.

It is worth mentioning that sustainable tourism tries to decrease the negative impacts of tourism. Smith’s (1989b) study of Eskimo tourism in Alaska illustrated that the tourists discovered Northern Alaska and Eskimo culture vanished.

Similarly, McKean (1989) suggested that tourism in Bali, Indonesia, is conserving traditional culture, while simultaneously contributing to its inevitable change. By commoditizing folk dances and crafts, tourism has provided an incentive for their conservation and appreciation. Meanwhile, Bali culture is becoming modernized, partly as a result of new ideas and technologies introduced by tourism.

To this end, tourists should be informed about local customs, dress codes, acceptable social behaviours, etc. By means of advertisement visitors can be educated through introducing local cultural values, providing cultural guidelines, and presenting briefings about appropriate behaviour.

As McKercher (2003) noted, cultural sustainability increases people's control over their lives and strengthens community identity; it is also compatible with the locals’ culture and values. The following guidelines are principals for cultural sustainability planning and management:

- Initiate tourism with the help of broad-based community input;
- Support educational and training programs to improve and manage heritage and natural resources;
- Conserve cultural diversity;
- Respect land and property rights of traditional inhabitants;

- Guarantee the protection of nature, the local and indigenous cultures and especially traditional knowledge;
- Work actively with indigenous leaders and minority groups to ensure that indigenous cultures and communities are depicted accurately and with respect;
- Strengthen, nurture, and encourage the community's ability to maintain and use traditional skills;
- Educate tourists about desirable and acceptable behaviour;
- Educate the tourism industry about desirable and acceptable behaviour;

Duxbury *et al*. (2007) indicated ten key themes of cultural sustainability: the culture of sustainability; globalization; heritage conservation; sense of place; indigenous knowledge and traditional practices; community cultural development; arts, education, and youth; sustainable design; planning; and cultural policy and local government.

Furthermore, Eraqi (2007) claims that tourism development in Egypt has not only contributed to economic benefits in terms of job creation and has not only increased investment and development of projects to local Egyptian tourist destinations, but has also resulted in sociocultural benefits such as an increase in national income, more positive cultural exchange, and has yielded positive economic impacts on local businesses. Soini and Kangas (2009) also argued for the promotion of cultural sustainability in rural areas, as communities preserve their cultural identities more than in urban areas. Tourism strategy should concentrate on activities that help improve the skills of local people, create positive attitudes towards work, and encourage investment in the state’s infrastructure such as media, fairs, regional festivals, cultural museums, etc. It is necessary to facilitate direct contact between tourists and local people by encouraging rural families to invite tourists into their homes.

According to National Geographic’s definition “*Geotourism is tourism that sustains, or even enhances, the geographical character of a place, such as its* ***culture****, environment, heritage, and the well-being of its residents*”. Geotourism should strive for cultural sustainability and sustainable development (Figure 2.13).

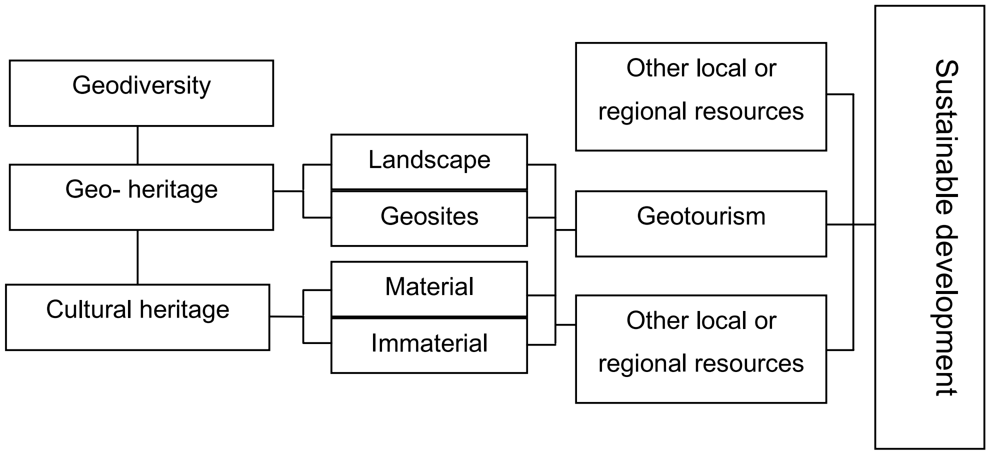


Figure 2.13- Geo-heritage's contribution to sustainable development and geotourism

(Source: Rodrigues, 2009)

Andrăşanu and Grigorescu (2008) argued that any geopark territory is not a sum of separate elements, but rather an organic context of spatial and non-spatial realities, shaped by its physical structure (geodiversity and biodiversity), human landscape and its historic evolution. The major role of the geopark is to help local communities to re-appropriate these values and to revive and strengthen the local and cultural identity in respect to sustainable development principles. Regarding this they suggested four basic ideas for approaching geopark development:

- Developing interdisciplinary detailed research studies to identify the territorial system components, their relationships, social and economical needs and assign a role and relative priority for each one related to local identity valorization;
- Use of the research results and multi-stakeholder approach to develop social, economic and cultural projects and to support active participation and involvement of local communities;
- Creating local, national and international partnerships for formal and informal education, public awareness, project development and to promote the area and its values;
- That due attention be given to activities from projects dealing with public awareness, cultural events, promotion, informal education, the potential of cultural goods for local or regional development, and the needs and the willingness of the local community concerned.

Recently, geoparks – through promoting geotourism in their territory – strive to achieve key themes of cultural sustainability and revive traditional culture while decreasing the negative cultural impacts of tourism.

For sociocultural sustainable development, geoparks hold workshops, festivals, fairs, and educational programs. Moreover, geoparks, through innovative strategies, try to introduce the traditional skills of locals to tourists. In this regard, Langkawi Global Geopark (Malaysia) exposed Malay herbal treatments and ancient health rituals to tourists. A geopark song sung in the local language is one strategy to prevent the demise of the local language in the area (Azman *et al*., 2010). Presenting local handicrafts, souvenirs, local products, and organizing exhibitions, fairs, festivals, and workshops together with the establishment of cultural museums can be not only a solution for local economic rehabilitation, but can also recover the traditional style of life and local customs.

For instance, in the Stone Forest National Geopark located in southwest China's Yunnan Province, visitors can observe the folk customs and local culture while enjoying the beauty of science and Karst landscapes (Xun and Milly, 2002). Geologically, Tower Hill is an international site of significance and the main site for Australia's first Global Geopark, Kanawinka. Tower Hill, by balancing modern artwork, nature-based cultural tourism, environmental management and bush-food enterprises with traditional aboriginal knowledge, has revitalized culture and strengthened sustainability objectives (Collyer, 2007).

Organizing regional festivals, fairs and exhibitions is the first strategy which geopark authorities apply to cultural sustainability. Regarding this, the Mongols in Hexigten Global Geopark (China) hold a grassland Nadam fair during the summer and autumn to celebrate their harvest (Tingshan, 2004); it is worth mentioning that the Nadam fair is a historic festival in this territory which the geopark has tried to revive.

Organizing a project regarding making homemade maize bread in Arouca Geopark, Portugal, which was attended by 120 people, mostly women, was a strategy to revive the traditional gastronomy in this territory. This project was an important opportunity to involve local communities with Arouca Geopark and to promote knowledge about geosites, especially the maize bread rocks geosite and cultural sustainability (Sousa *et al*., 2011).

In order to attract people to visit the Lesvos Petrified Forest European Geopark (Greece), the local governors organize several scientific and cultural events during the year. These include natural history exhibitions, lectures, book presentations, exhibitions of sculpture, painting and photography, music concerts, theatre performances and several other cultural happenings (Zouros, 2004).

Réserve Géologique of Haute Provence (France) and Hateg Country (Romania) European geoparks, through holding exhibitions, and inter-cultural dialogue (dialogue between Man and Earth) among researchers, artists, teachers, and peasants strive for cultural sustainability in their territories (Andrăşanu and Giraud, 2009).

Puay Liu and Abd Halim (2008) according to a pilot survey in villages in Padang Mat Sirat and Kilim of Langkawi Geopark noted that most local communities agreed that Radio Langkawi FM was a major source of information on Langkawi Geopark, particularly when it played Geopark local song during the morning airtime show. The local community said that the geopark song helped to remind them that Langkawi is a geopark.

According to Ramsay *et al*. (2010a), the presentation of traditional dances, music and stories during the Geoparks week is another strategy for cultural sustainability in Hateg Country Dinosaurs Geopark (Romania).

Providing geo-trails (a geo-trail is a service that promotes hiking and outdoor education) passing through the villages and the surrounding cultural landscapes (Rodrigues and Carvalho, 2009) is another strategy for cultural sustainability in geoparks. These geo-trails are opportunities for visitors to observe and to experience the lifestyle, architecture, customs and cuisine of local people who live in the geopark territory.

The Global Geopark Bergstrasse-Odenwald, situated in the southwest of the State of Hesse (Germany), designed a geo-trail with two sections through the cultural landscape of Michelstadt's graben structure. The geo-trail of Michelstadt offers geological features, cultural highlights and mining history to visitors. Moreover, an annual program for guided tours is available for tourists (McKeever *et al*., 2010). Another important tool to communicate the vivid relationship between man and nature is the implementation of geo-points in the Bergstrasse–Odenwald Geopark. These geo-points contain earth history and connect it with local history and tradition (Weber, 2009).

Aside from the above activities, reconstruction of architectural elements in geoparks can be a solution to achieve cultural sustainability. Regarding this, Cabo de Gata European Geopark (Spain) runs a project of rehabilitation and consolidation of the water-wheels as the most numerous and important architectural elements in the landscape of the Cabo de Gata region (Mendoza and Navarro, 2007).

With the purpose of understanding the folklore and the character of Sobrarbe European Geopark (Spain) various public and private initiatives have emerged to recover and manage the mining heritage in this territory. The Sobrarbe Geopark supports these projects and works to unite them, so they can be effectively managed. In order to achieve this goal, there are currently three infrastructures distributed throughout the area: the Geopark Interpretation Centre, the Bielsa Museum and the Geo-mining circuit. The Interpretation Centre (Aínsa Castle) presents the mining heritage, especially the geology related to mineral deposit formation. The community's way of life is highlighted at the Bielsa Museum. Lastly, the Geo-mining circuit summarizes, in five panels, the role of mining technology across the landscape (Poch, 2007).

Examples also illustrate that geoparks aim to revive traditional food, local arts, and traditional culture through exposing them to tourists; thereby geoparks, by promoting geotourism and innovative strategies, reduce the negative sociocultural impacts of tourism in their territory.

Naturtejo European Geopark, for the purposes of cultural preservation, tries to improve local products and a service related to nature and cultural tourism, and strives to increase the level of use of equipment and services and cultural tours to both the resident population and tourists. Authorities of Naturtejo European Geopark also develop network activities, tourism marketing and cultural programming in this territory (Marques, 2009).

The establishment of a brand new geo-restaurant in Naturtejo European Geopark not only looked for inspiration in the local landscape but also revived past civilizations and ancient culture thousands of years old. This geo-restaurant was opened in 2010 by *Carlos Santos*, a businessman from Idanha-a-Nova. He tries to stimulate traditional flavours (Naturtejo Geopark Authorities, 2010a).

Using the brand or logo of geoparks for promoting quality of local products as cultural components can be another strategy for rehabilitation of at least some of them. In order to evaluate agro-tourism enterprises, the Psiloritis Natural Park and European Geopark (Greece) organized a project titled ”Land of Psiloritis” in the geopark territory. Regarding this, members which use the geopark logo as the brand name for a network of cooperating enterprises have to fulfil certain quality standards that have been set in collaboration with the geopark and are evaluated every year by a common group of specialists (Fassoulas and Zouros, 2010).

The last but not the least strategy as an innovation for cultural sustainability in geoparks is the integration of handicrafts or local products as cultural components with geopark characteristics (e.g. geo-products).

Geo-products are local products related to geopark activities and are symbols of geological and geomorphological heritage of the geopark (Rodrigues and Carvalho, 2009; Farsani *et al*., 2010).

Geo-products which are made based on geological elements of geoparks not only introduce the local products and the local handicrafts as cultural components to tourists, but also increase the public knowledge of tourists about geology.

Pursuant to geopark activities, it is evident that geoparks can play a role in the cultural sustainability of their territories.

According to Nickerson (2010) geotourism strives to sustain the region's landscape through perpetuation of local values and attracting visitors who actively promote local values through their travel behaviour. The responsibility of geotourism is to keep things 'as they are' for the resident or develop things 'their way' rather than change for visitors.

Geotourism as a target of geoparks increases value of the local business, local landscape and culture connected to the geopark. As mentioned before, there are cultural trails in geoparks in which tourists observe cultural panorama and are educated about the relation between geological heritage and cultural heritage.

2.10. Socioeconomical Impacts of the Establishment of Geoparks

The purpose of this section is to investigate the effects of geopark creation on the development of the local economy through geotourism. Since tourism marketing is a key factor in the development of the local economy, the section starts by reviewing the literature on tourism and economy. After that the literature provides an overview of issues relating to geoparks, geotourism and the local economy.

Horn and Simmons (2002) noted that the economic importance of tourism plays a role in determining residents' attitudes. As economic benefits increase, residents' attitudes become more favourable. In general, tourism is favoured by developing economies because it is a so-called invisible export (Brohman, 1996). This means it brings foreign exchange into the country without shipping any resource or product abroad.

The money that tourists spend remains typically in local hands. Research by Hampton (1998) and Scheyvens (2002) validates this point. Both researchers found that backpackers, typically explorers or drifters by nature, make significant contributions to local economies without triggering significant leakage. The money that backpackers spend goes directly to local people who themselves are supported by a network of local producers ranging from farmers to labourers and artisans. Therefore, small-scale local investment in tourism has positive impacts on the local economy.

The experience of Paul Lepp (2004) in Uganda, East Africa, illustrated that the involvement of local communities would best describe the present state of tourism development. In this regard, the government should encourage local people to promote tourism in rural areas.

In view of the fact that it provides economic and other benefits to local residents, such as creating job opportunities and generating income, as well as some other services, products and supplies, geotourism has, nowadays, been introduced as a best form of sustainable rural tourism marketing.

Since all abiotic natural objects are located in rural areas, development of geotourism in these areas can be a chance for rural development (Bębenek, 2006). Geotourism development also represents a partnership between the government, local people, and private sectors: local businesses, active tourism companies, tour agencies, restaurants and accommodation among others. This partnership is welcomed because it makes good economic sense and can benefit all partners (Dowling, 2009). For instance, geoparks and geotourism development may have a great potential for local sustainable socioeconomic development. In China, the focus is the enhancement of employment and new economic activities linked to the specialties of each geopark. The establishment of individual geoparks should favour new orientations in tourism (geotourism), and in trades and crafts (geo-products), such as the sustainable manufacturing of innovative handicrafts which have a geological connotation, for example fossil casting and souvenirs (Xun and Milly, 2002).

Local governments of Yuntai Geopark in Henan (China), introduced geotourism as a new economic growth point which can improve the expense of geoheritage preservation, increase local revenue and enhance employment. In 2001, the number of visitors reached 600,000, and the income from admission fees amounted to 14 million Yuan, twice the average of the previous years. In 2002, the number of visitors soared to 940,000 and the income from admission fees increased to 27.2 million Yuan, up 68% and 97%, respectively, compared with the previous year. More than 60 hotels were newly built in the county, and about 4,000 jobs were provided by tourism development (Xun and Ting, 2003).

Another example in China is Jinhu Geopark in Taining County, Fujian Province, established in 2000. Tourism marketing attracts a great number of visitors to this territory. In 2001, the total revenues from tourism reached 202 million Yuan, 35.7% over the previous year, accounting for 13.5% of the county's GDP. Revenues from tourism increased to 450 million Yuan, up 123% compared with the previous year and accounting for nearly 30% of the county's GDP. Thus, tourism has become a pillar industry of the county. It has brought along such trades as catering, transportation and cultural recreation, providing employment for about 2,800 people (Xun and Ting, 2003).

Zouros (2004) noted that the Petrified Forest of Lesvos (Greece) is in collaboration with nine agro-tourist cooperatives, and during the summer period the Petrified Forest Natural History Museum organizes an agro-tourist festival. In order to promote the quality of local products, food and drinks made using old recipes from the women of the surrounding villages of geopark are used. In addition, the Petrified Forest of Lesvos European Geopark has created links with local tourist enterprises, restaurants and small hotels in order to increase the number of park visitors. Pursuant to geopark establishment and local governors' activities, the amount of "Bed and Breakfast" accommodation has doubled in the village of Sigri. What's more, the visitors have increased the duration of their visit to the geopark. McKeever *et al.*, (2010,p.225) described the creation of the Lesvos Petrified Forest European Geopark (Greece) as transforming western Lesvos, attracting 90,000 visitors annually and employing 35 locals directly and with hundreds of new jobs having been created indirectly. The geopark is now the island's main visitor attraction and is an excellent example of how the holistic approach to conservation used in geoparks can be successful from the perspective of the local community.

Nowlan *et al*. (2004) explained that the decline of the rural economy in recent years has meant the depopulation of many small towns in North America. Such areas, by converting to geoparks, can take enormous advantage from geopark-related activities. Examples include places with exceptional fossils, rocks or minerals, areas with a rich history of mining or energy development that is now finished, and remote communities in northern regions. Thus, establishment of geoparks in North America can increase tourism to these areas and help to reverse a declining economy.

According to Dusar (2004), the application of the geopark concept to the mountain karst areas in Vietnam may be the best way to guarantee preservation of the unique karst landscape, offering at the same time sustainable development and an acceptable share of the national improvement of standards of life to its inhabitants.

Establishing family guest houses (Bed and Breakfast) in Naturtejo European Geopark (Portugal) can be a strategy to promote the local economy. An example for this is *Casa de Forno*, an ancient community oven that was turned in to cosy accommodation and a geo-bakery. *Casa de Forno* is managed by a geologist couple and their family. They also organize some outdoor and geo-tour activities for visitors (Geraldes and Ferreira, 2009), such as TTransGeopark 4x4.

Naturtejo Geopark organizes a project of promotion of geological heritage, and local economic development through geotourism. Collaborating with active tourism company *Incentivos Outdoor* (which runs the boat trips to the *Porta de Rodão* Natural monument and the *Neolithic Tejo* Rock Art), organizing geo-sports (geo-kayaking in *Portas de Rodão* and Tagus River), consulting with local businesses to produce geo-products (geo-pizza, trilobite and geo-cakes), establishing geo-restaurants, etc., are new activities which the local management of the geopark applied to promote the local economy (Rodrigues and Carvalho, 2009).

The European Geopark Bergstrasse-Odenwald (Germany), in order to promote geotourism, invited local groups to join the geopark on-site network and to participate in training for geopark administration. By the end of 2009, more than 150 active geopark guides, as part of the geopark's visitor service, were trained. This activity is not only a step towards sustainable development, but also creates job opportunities for local communities (Eckhardt, 2009).

Furthermore, Turner (2006) urged that establishing geoparks in Australian-Pacific regions can bring benefits for farmers in rural areas and small businesses.

The geopark also supports the marketing of local handicrafts such as production of fossil casts and souvenirs by local enterprises. The local products are supplied in agro-tourist festivals or are also sold in the Museum snack-bar (Zouros, 2009).

The *Quinta da Vila's* service is family accommodation located in Alvarenga village (Arouca municipality) which is certified by the Arouca Geopark Association. *Quinta da Vila* offers geopark adventure sport programs (geopark experience packages). It is noteworthy that 41% of the 2010 *Quinta da Vila's* sales were made through the experience packages (Peres, 2011).

Moreover, *S. Pedro* Hotel located in Arouca Geopark promotes programs and experience packages of nature, adventure and cultural tourism of the geopark. At the end of 2011, the occupancy rate of 33.45% means a positive trend, being higher than the 24.80% of the previous years (Brito, 2011).

Consequently, geotourism as a niche market is still at an early stage of commercial development, but experiences and examples illustrate that the creation of geoparks and the development of geotourism as a branch of sustainable tourism can be an innovative solution for the development of rural economies.

2.11. Socio-Environmental Impacts of the Establishment of Geoparks

Aside from the development of the local economy, preservation of natural heritage and popularization of the environment, science, especially geo-sciences, is the main target of the establishment of geoparks.

In order to achieve these goals, each geopark should take advantage of local knowledge and should try to ascertain the best means of knowledge transfer in its territory.

This section looks at the strategies applied by geoparks for education, conservation of the natural heritage and minimization of negative impacts of tourism upon the environment.

2.11. 1. Geoconservation in Geoparks

Environmental values refer to individual and shared community or society beliefs about the significance, importance, and well-being of the natural environment, and how the natural world should be viewed and treated by humans (Reser and Bentrupperbäumer, 2005). Tourism has consequences for the environment, sometimes positive and not uncommonly negative. For instance, mass tourism has a negative impact on natural resources; that is why local communities are usually not interested in it (Fennell, 2003). Tourism for Nature (ecotourism), the creation of national parks and wildlife parks (e.g., Yellowstone Park in USA and the Amboseli National Park, Kenya), protection of reefs and beaches in the Great Barrier Reef (Australia), and maintenance of forests such as the New Forest (UK) are positive direct environmental impacts associated with tourism (Cooper *et al*., 2005).

Geoheritage, which draws attention to the geological and geomorphological elements of nature worthy of conservation, has for years been considered less vulnerable than other environmental values. Therefore, it has not received the same amount of attention from the conservationist movement as cultural and ecological heritage (Reynard and Coratza, 2007).

Reimold (1999) argued the importance of geoconservation. His study has some major purposes. Firstly, geoheritage is a part of general environmental protection; secondly, education relies on well-preserved natural instruction sites; thirdly, scientific use demands protection of this heritage, for future examination, for comparison with new discoveries, and for renewed scrutiny of previous hypotheses.

Geodiversity (Gray, 2004) is currently used in parallel with the term ‘biodiversity’ to indicate the natural diversity of the abiotical part of nature and its influence on both biodiversity and cultural diversity.

According to Burek and Prosser (2008) geoconservation is a growing activity, with more participants and a greater profile now than ever before. They noted that geoconservation is very well established in the United Kingdom and increasingly across Europe and Australia, and with the World Heritage List and especially the rapid growth of geoparks; it is now coming to importance in many other parts of the world.

Geological Societies (IUGS) and UNESCO have been sponsoring a project called GEOSITES, which aims at the preservation of unique and typical sites, representing geology, geomorphology, stratigraphy, paleontology, archaeology, hydrology, etc., on a global level (Wimbledon, 1996; Wimbledon *et al*., 1996). To this end, Reimold (1999) suggested that geoconservation on the African continent has not featured very prominently to date and unique and typical geosites need to be identified. In Switzerland, for example, a working group on geotopes was founded by the Swiss Academy of Sciences in 1994 (Heitzmann *et al*., 2006); a strategic report on geotopes was published in 1995 (Strasser *et al*., 1995) to be followed by a similar report on geoparks (Reynard and Coratza, 2007), and the first list of geosites of national significance was published in 1998 (Working Group for the Protection of Geotopes in Switzerland, 1999).

Johnson *et al*. (2010) noted that converting a geological site to a geosite, and, if the size and relevance are applicable, to a geopark may be not only the best way to promote tourism marketing in these areas, but also a strategy to preserve geological heritage. For example, the island of Mauritius, located in the Indian Ocean, where geology, scenery and climate are closely similar to those of Hawaii, can be converted to a geopark in order to attain a sustainable development model.

Moreover, Pereira *et al*. (2007) presented the various steps involved in the compilation of the inventory, selection, and assessment of sites of geomorphological interest for promotion by the Montesinho Natural Park Board (Portugal), especially with regards to their educational value.

Since education can be a means of conservation of natural heritage (both biological and geological), Anderson and Brown (2010) demonstrated that activities such as creating teaching resources, using the latest technologies, supporting field trips, building up a web-site presence, promoting school visits, conferences, exhibitions, supporting museums, and disseminating information through major teaching associations can be good examples of how to popularize and preserve the Quaternary of the British Isles.

Besides, geoconservation can contribute to the objectives of Agenda 21, highlighting the potential for interaction between socioeconomic development and conservation of the natural environment. This approach allows consideration of other issues like geodiversity, geological heritage, geotourism, geoparks, and geoeducation as concepts of geoconservation (Andrăşanu, 2007a and 2007b) (Figure 2.14).

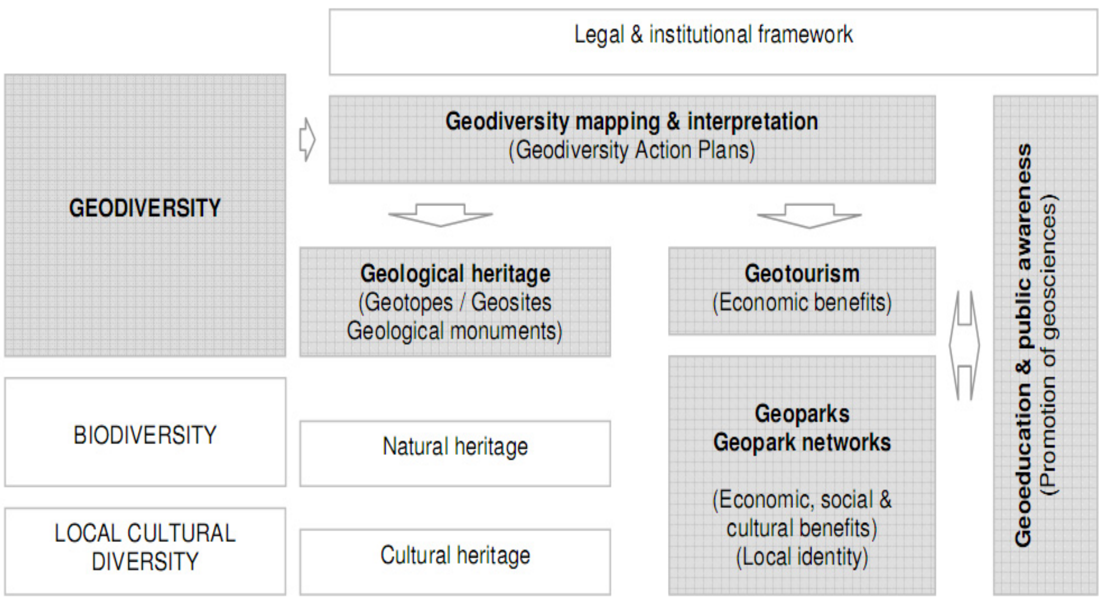


Figure 2.14 - Basic concepts in geoconservation and their relationships
(Source: Andrăşanu, 2007)

In the last decade, the UNESCO declaration on geoparks as a new model of sustainable development has highly strengthened the strategies such as local communities' participation in protecting natural heritage, organizing educational programs, and promoting geotourism. It is stated that indigenous people should not be removed from the lands where they live, since the locals' knowledge, traditional arts, and traditional style of life play a vital role in geopark management.

As mentioned before, geoparks are set up at an international level but managed at a local level. Hence, geopark authorities encourage local communities to follow cultural interchange and identity preservation. They also motivate local people to participate effectively in achieving sustainable development and sustainable tourism in geoparks.

Managers of geoparks try to improve the welfare of indigenous communities through innovative activities and consulting with local business people, artists, tour operators, private sectors, accommodation facilities, restaurants, and producers. In addition, they involve locals in conservation and educational activities, and imparting of local knowledge.

The officials employ network activities for the implementation of geopark targets (Figure 2.15). The network illustrates the close relation between geotourism and geoparks and local communities, private sectors, local government, schools, universities, environment, businesspeople, NGOs (non-governmental organizations), and tourism sectors. A regional network can provide the most appropriate and practical mechanism for sharing information, education, and training resources. Also, establishing related organizations can help in information management, communication links, training and advisory services, sharing experiences, research, and development.

Whereas conservation is a target of geoparks, environment organization has close collaboration with the geopark. However, in the geopark the conservation activities have a specific form, since the geopark tries to involve locals in preserving their territory. Geopark officials believe that no one knows the area better than the local people; therefore they stimulate locals to conserve the geopark through economic incentives and education. Each geopark, in order to be preserved, utilizes innovative strategies.

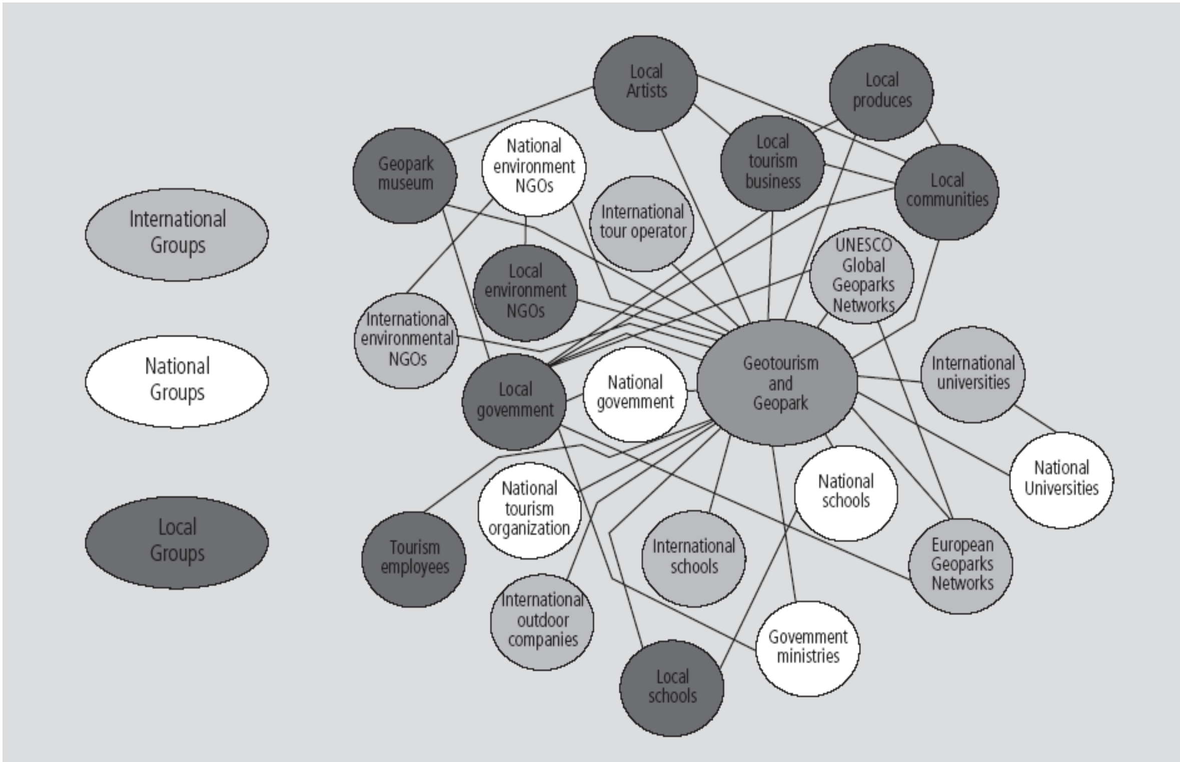


Figure 2.15 - Networks in geoparks activities (Source: own construction)

2.11.1.1. Involving Local Communities in Geopark Activities

As mentioned in the last section, preparing an inventory of geological heritage, introducing geotopes and establishing geosites and geoparks can be a way to conserve geological heritage sites. However, for this purpose geoparks utilize innovative strategies in order to promote conservation of natural heritage. The first strategy is local communities' involvement in geopark conservation. In most geoparks, officials take advantage of indigenous knowledge for geopark conservation and management, and in this case, the geopark directly develops the local economy through the creation of supplementary income for locals and improves their natural and geological knowledge.

According to Azman *et al*. (2010), one of the key factors for sustainable conservation in geoparks is the level of awareness of stakeholders, particularly the local communities. Regarding this Langkawi Geopark (Malaysia) prepared a special brochure explaining Langkawi Geopark and distributed it to local villagers, organized a regional conference, involved local women in geopark activities, encouraged locals to diversify their traditional activities to commercial activities and made a short announcement about geoparks in the mosques.

Sustainable development in recycling the hawksbill turtle hatchery with the help of indigenous people was a strategy in Qeshm Global Geopark, Iran. This movement not only preserved marine turtles but also created seasonal job opportunities for locals (UNDP, 2003a). In this project which is supported by UNDP (United Nations Development Programme), local people are paid by the government for their contribution in collecting the turtle eggs and then transferring them to the protected coast in Shibderaz which is managed by local people. This successful experience saved 27000 turtle eggs and 16000 turtles in 2003.

At present, preservation of marine turtles continues under the support of Qeshm Geopark and local Environmental Department.

A pilot project in Salakh village was another strategy in Qeshm Geopark territory. It was developed for the rehabilitation of natural marine resources through an indigenous method of artificial reefing. The process of artificial reefing is completed, secured, and guarded by local fishermen (UNDP, 2001).

Aquaculture of pearls by the local community, especially women of the Berkeh Khalaf village, was the third strategy for preserving natural resources and entrepreneurship for local women in Qeshm Geopark (UNDP, 2003b).

Moreover, the Copper Coast European Geopark (Ireland) collaborated in the construction of a wetland project for preserving a bog, and the eco-park used the development of this integrated constructed wetland to organically treat their waste water whilst supporting a diverse range of flora and fauna, and improving the beautiful environmental features. It has the added benefit of maintaining the character of the surrounding landscape. This project created 350 job opportunities for locals (Richardson and Shakespeare, 2009).

Aside from local communities' involvement, integrating national and international events with geopark activities is another strategy for earth conservation. For instance, on World Forest Day, Casa do Forno outdoor company and geobakery with Naturtejo Geopark invited media and the local people from the village of Orvalho to know more about cultivation of native plants, touching the soil to plant a *Viburnum* or a *Prunus lusitanica*, two of the endangered tree species to be found at Fraga da Água d'Alta geosite. This natural monument presents one of the last natural refuges in Europe for the evergreen forest that existed more than 2 million years ago.

Moreover, On Clean Portugal Day (20th March) Naturtejo Geopark, Castelo Branco, Oleiros, Proença-a-Nova and Idanha-a-Nova municipalities supported the initiative and invited about 550 volunteers to clean the geopark territory. Despite the rain, they cleaned 83 tons of garbage (Naturtejo Geopark Authorities, 2010b).

In addition, geoparks have an important role in landscape preservation. Therefore, the officials of geoparks rebuild historic and old places instead of modernizing them. Regarding this the Réserve Géologique de Haute-Provence European Geopark (France) has rebuilt an old house for the art installment in Veil Esclangon (Unjah,2008), and the Naturtejo European Geopark (Portugal), at Portas de Almourão geomonument, and Penha Garcia Ichnological Park, has changed the use of four dilapidated historical buildings; they have been converted to popular tourism facilities like a conference hall, tourism office, and museum to follow the tenets of sustainable tourism in the geopark. It is noteworthy that Casa de Forno which is located in Naturtejo Geopark (Portugal) territory was an ancient community oven that was almost in ruins in 2007, and was saved by a local couple of geologists and their family; it has been turned into cosy accommodation and a geobakery (Geraldes and Ferreira, 2009).

Moreover, Naturtejo Geopark (Portugal), in order to protect the geological heritage of Portas de Almourão geosite from flooding, contributed to the project of building the Alvito Reservoir 1 km upstream. The implementation of this project caused less environmental impact on the geomonument. In the project there were several environmental issues such as: following up the project in order to minimize impact on the geological heritage; developing heritage and valuing the region; and eliminating barriers for the ichthyofauna. These were controlled by the Naturtejo Geopark (Carvalho and Rodrigues, 2010b).

Since education and involvement of locals in conservation projects can be ways for conservation of natural heritage (ecological-geological), the next section will focus on the educational activities and programs, as a strategy for conservation of natural heritage in geoparks around the world.

2.11.1.2. Educational Activities in Geoparks

In fact, since long ago people have come to visit "geological wonders" like mountains, caves, and canyons. However, only in recent times has there been a real challenge in this sector and geological heritage has been developed into a market (geotourism) with very specific and novel characteristics.

Nature Tourism is supported by sustainable use of natural heritage and promoting nature awareness, through interpretation. Nature Tourism as a niche market has grown world wide in recent years and looks for certified destinations, as the authors want to develop it in geoparks under the auspices of UNESCO.

Geotourism is an emerging segment of Nature Tourism in which the objective focuses on geodiversity. A new niche market was created for business with new specificities and new contingencies that not only accompanies the general trends of tourism but also imposes its own trends. Geoparks are pioneers in geotourism and an example of sustainable local development. A geopark acts as a partnership of people and land managers working to promote earth heritage through education and sustainable tourism (Bailey and Hill, 2010).

Dias and Brilha (2004) noted that in order to increase public awareness about geological heritage, some initiatives should be implemented for each protected area, like geological and geomorphological maps, as well as a geosite map, a geological guidebook, web pages, geological trails, and interpretative panels. These are all examples of innovation (Figure 2.16).

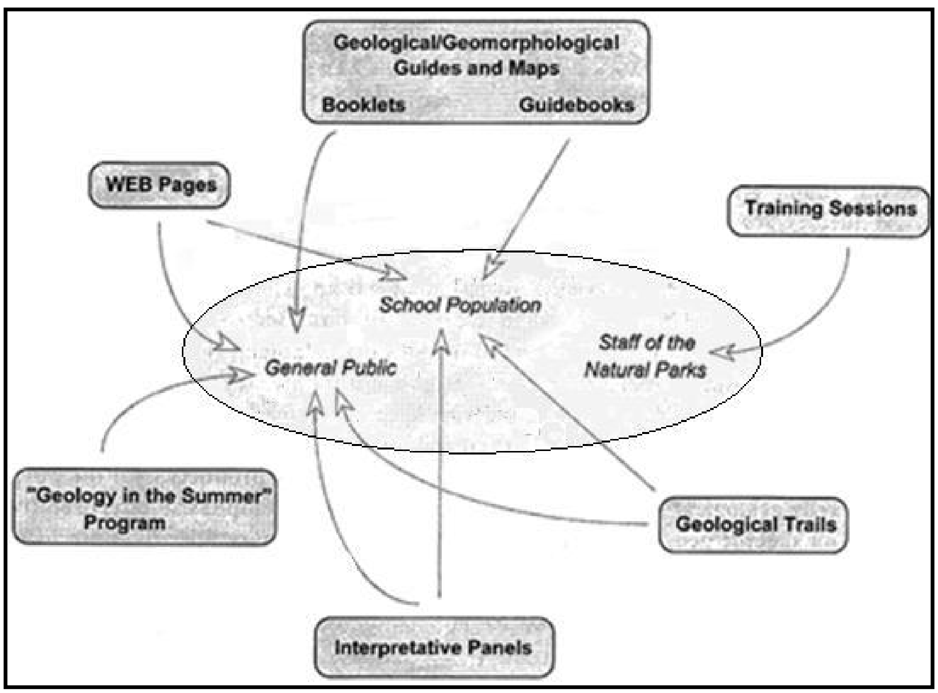


Figure 2.16 - Proposed initiatives in order to increase public awareness of geological heritage (Source: Dias and Brilha, 2004)

Geological processes with high scientific interest can be associated with aesthetics and become geosites, with tourism potential. The intention is to stimulate knowledge of geodiversity, geoconservation, and sustainable development.

Beside geodiversity, geotourism has some other benefits; a site with rich geological heritage should have cultural, historical, and natural (bio and geo) approaches. But it is important to present a good interpretation and supportive structure.

A geopark organizes activities and provides logistic support to communicate geoscientific knowledge and environmental concepts to the public. This is accomplished through protected and interpreted geosites.

Museums, information centres, geo-trails, guided tours, school class excursions, popular publications, maps, educational materials and displays, seminars, and so on are strategies applied by geoparks to educate locals and tourists. A plan for sustainable development in a geopark territory needs interdisciplinary studies and cooperation among universities, local authorities, and different stakeholders (Andrăşanu, 2005). A geopark also fosters scientific research and cooperation with universities and research institutes, stimulating the dialogue between the geosciences and the local population. Moreover, a geopark can create the framework, motivation, and support for integrated research, education and training.

Education, as a lifelong process, is widely accepted as a fundamental prerequisite for the achievement of sustainable development. It is also recognized as a means of changing consumption and production patterns to a more sustainable path (DiSano, 1995).

Since education is a target of geopark creation and local schoolchildren's education can have serious consequences for sustainable development, most of the geoparks, as spectacular outdoor classrooms, have set up educational work programmes to re-orient education towards sustainable development.

Geoeducation, formal or informal, is a part of the conservation purposes of geological heritage sites that have worth for scientific, educational, and aesthetic reasons. Inventory, databases, and maps of sites are not enough for geopark conservation; it is necessary to set up educational strategy in partnership with local schools, universities, and local councils.

The aim of the Global Geoparks Network is to provide a platform of cooperation and exchange of knowledge between experts and practitioners in geological heritage matters under the umbrella of UNESCO. Establishing geopark museums and interpretive centres, holding annual conferences of the European Geoparks Network and the Global Geoparks Network, holding annual meetings, organizing workshops for tourists and locals, publishing books, newspapers, and magazines, interviewing on TV and organizing radio training for tour guides, and investing in educational programs for schoolchildren and universities are geopark enterprises in this regard.

For instance, officials of Naturtejo European Geopark (Portugal) believe that educational programs can be a means of conservation of geomonuments and natural heritage. Accordingly, they implement an educational program for schools and universities. Naturtejo Geopark started the educational programs in 2007 and by the end of 2009 they had succeeded in educating 3813 students and teachers between the ages of 4 to more than 70 years old. This program embraces two educational activities including 'School Meets the Geopark' and 'The Geopark Goes to School'. In this regard, the geopark has employed local geologists and former teachers, since no one knows the geopark territory better than locals (Catana and Rocha, 2009).

Apart from the educational program for schoolchildren, Naturtejo Geopark established a dinosaur exhibition in 2010. This exhibition received 22041 visitors, over the course of 7 months, in many educational programs (Naturtejo Geopark Authorities, 2010c).

Furthermore, officials of Arouca European Geopark (Portugal) play a vital role in educational programs and at the end of 2009 they succeeded in educating 3956 pupils and 331 teachers who came from all over the country (Catana and Rocha, 2009). Likewise, the geopark runs an educational project called "Geoteca". This project was initially developed for local school libraries and the main goal of the project was to improve the knowledge of students and teachers about Arouca Geopark (Rocha *et al*., 2009). In this regard, the geopark held a workshop entitled "Make your own Trilobite". This workshop reinforced the knowledge of the students about trilobites and geopark activities; the children painted trilobites and dressed up as trilobites, raft boats and hikers at Carnival 2009.

Moreover, the Réserve Géologique de Haute-Provence European Geopark (France), with a view to geo-education, established the so-called "Georium" in the Museum *Premonade*, as a part of an interactive tool for schoolchildren from 6 to 13 years old.

Besides, in order to maintain the standard of scientific information and quality of guides, all guides are encouraged to take the course with the Réserve. At present, 23 active nature guides have joined the Réserve domestic network. Guides and their partners, through educational programs, have attracted much more tourist attention to this area. Training geotourism guides is another educational innovative activity in this territory (Unjah, 2008).

Holding workshops for children on minerals, water, and volcanoes and organizing workshops for adults on volcanology, minerals, and fossils are educational activities in

Vulkaneifel European Geopark (Germany). Moreover, Vulkaneifel European Geopark organizes the Willi Basalt tour for schoolchildren (Frey *et al.*, 2006).

Establishing an educational centre in the noble castle that looks over the medieval town of Aínsa in the heart of the Sobrarbe Geopark (Spain) is another strategy, which not only increases the locals' and tourists' knowledge but also preserves the castle as historical heritage. The noble castle has discarded its defensive role and become a vacationing, educational, and cultural complex; some of its recently created spaces are related to the geopark. The three new facilities, the Sobrarbe Geopark visitor centre "Space of the Sobrarbe Geopark", the "Technical Office", and the "Geovision Room" were considered in the Master Plan (2004-2007) and spread out among the northeast and southeast towers of the Aínsa Castle (EGN, 2009a)

The Landscape Model of Water Erosion is a place (11 × 9 m in size) which represents the geological approach to water activities. This model is an innovative educational model for kids to know more about the water erosion process in the Eisenwurzen European Geopark, Austria (Kollmann *et al*., 2009). Tourists and kids feel like Gulliver in Lilliput Land when they visit the landscape model of water erosion in *Gallen* Park (Kollmann and Mitterbäck, 2009)

The *GeoBox* project and Geo-workshops are other educational programs for schoolchildren in Nature Park Eisenwurzen (Austria); these activities are concentrated on erosion, rivers, fossils and rocks (Ramsay *et al.*, 2010b).

Zouros (2010) urged the Lesvos Petrified Forest European Geopark (Greece) to organize environmental education programs for elementary and high school. In addition, activities such as geosite recognition, fossil excavation and conservation, nature observation, and bird watching are other educational programs in Lesvos Geopark. Normally, schools visit the geopark during the spring and autumn, outside the main tourist period. A variety of educational tools have been created for the needs of environmental education programs (such as museum kits, an educational CD, booklets, student booklets) for all levels of education. The two museum kits focus on plant fossils and volcanic rocks. Besides, the geopark supports university field camps dedicated to various scientific disciplines.

Moreover, Lesvos Petrified Forest Geopark offers pupils knowledge about earthquakes; in this regard it installed a seismic table simulator at the Natural History Museum of the Lesvos Petrified Forest to create an opportunity for schoolchildren to experience an earthquake simulation (Zouros *et al*., 2010).

Furthermore, the visitor information centre (The Lady Nelson) in Australian Global Geopark, Kanawinka, gives visitors both professional and recreational overview of the region, and this place helps in employing local and other scientists, writers, photographers, and artists to produce dedicated geopark literature. In addition, the visitors can enjoy seeing and hearing the erupting neon volcano in the geology room of the visitor centre and they can have a walking tour in a glass floor cave (The Lady Nelson Centre, 2009).

In 2008, English Riviera European Geopark (UK) ran a project titled “Rock It!” This is a two-year community development and education project that is focusing entirely on working with local people to enhance awareness and enjoyment of the geopark. Schools and other youth groups are being given the opportunity to experience various geological sites with local schools. Curriculum linked resources, educational support materials and programs of study are being developed in partnership with local teachers through new and existing networks. In addition, the project is providing information and interpretation materials to the public and educational groups. The project improved educational tools such as signposting, providing maps and information in the form of leaflets and developing the geopark website (Acland, 2009).

Gea Norvegica European Geopark (Norway) has designed a site for students and teachers of secondary schools (Figure 3.20). Also, Gea Norvegica Geopark has developed some fundamental educational packages to be used in primary and secondary schools. Consequently, in March 2007, with the geopark’s collaboration, geology became defined in the curriculum of secondary schools (Geo1 and Geo2) (Annual Report, 2007).

It is worth mentioning that Adamello Brenta Geopark (Italy) organizes educational activity under the brand of “Park Quality” and until 2011, 19 schools among 59 schools located in geopark territory were awarded “Park Quality” (Mase and Maestranzi, 2011).

Regarding educational activity the Sobrarbe Geopark (Spain) established several trails, such as: karst trail, fluvial terraces trail and glacial landscapes trail, for pupils aged 12-16 (Ribas, 2011).

Consequently, apart from Global Geopark conferences, European Geopark conferences and meetings, which play an important role in the exchange of knowledge, each geopark offers a wide range of environmental education programs (related to culture, ecology and geology) and field trips to find approaches to conservation, development, and public awareness.

Regarding educational activity, each geopark tries to apply new strategies, by establishing themed museums, establishing theme networks and trails, providing educational tools for visitors, schoolchildren and kids (geotourism maps, signposts, interpretative panels, workshops, geotour guides, etc.), organizing meetings between geopark authorities and local communities and holding conferences that constitute good examples.

Thus, educational activities in geoparks can not only be a solution for achieving sustainable development but they also increase the awareness of local communities and visitors about their environment and the earth where they live. It is noteworthy that the idea of education in geoparks includes non-formal education for people who are not at school anymore as well.

2.12. Innovation in Geoparks

There are various definitions of the term “innovation”, which derives from the Latin “innovatio” meaning the creation of something new (Table 2.7). Innovation includes both major and minor changes; major change being called radical innovation (Urabe, 1988). Innovation creates different (and hopefully better) approaches and thus innovation is a key that may unlock growth (Sundbo, 2009). For the innovative enterprise to create pure profit, the innovation should generate and maintain a unique competitive advantage in relation to competitors in the domestic market as well as in international trade.

All of the following introductions indicate that innovation is a new idea or brainwave, which ends up creating new products, structure, technology, and so on, but this new idea, should be profitable for business or industry.

Table 2.7 - Innovation definitions from 1995 – 2009

Innovation definitions
Innovation is the core of competition and the dynamic efficiency of firms and industries (Schummpeter, 1934).
Innovation refers to the process of bringing any new, problem solving idea into use. Ideas for re-organizing, cutting costs, putting in new budgetary systems, improving communication or assembling products in terms are also innovation. Innovation is the generation, acceptance, and implementation of new ideas, processes, products, or services (Kanter, 1983).
Innovation consists of the generation of a new idea and its implementation into a new product, process, or service, leading to the dynamic growth of the national economy and the increase of employment as well as to a creation of pure profit for the innovative business enterprise (Urabe, 1988).
Innovation is the search for, and the discovery of, development, improvement, adoption, and commercialization of new processes, new products, and new organizational structures and procedures (Shy, 1995).
Innovation is generation of new or improved products, introduction of new production processes, development of new sales markets; development of new supply markets, and reorganisation and /or restructuring of the company; this definition has distinguished the five areas (Schumpeter, 1997).
An innovative community is therefore able to bring in new methods and ideas that can improve its environment and initiate changes through the imaginative ideas or artistic ability of its people (Velasquez *et al.*, 2005).
Successful innovation, e.g. innovation that is also profitable to the tourism firm in a competitive market must increase the value of the product or tourism experience (Weiermair, 2006).
Innovation has to do with doing things differently (and hopefully better) and thus, innovation is a key that unlocks growth (Sundbo, 2009)

Innovation systems are both social and dynamic. It is dynamic due to the 'financial flows between government and private organizations, human flows between universities, firms, and government laboratories, regulation flows originating from government agencies towards innovation organizations, and knowledge flows among these institutions' (McLean and Pillia, 2005). The complexity of linkages in a system of innovation is well summarized by the OECD (Organisation for Economic Co-operation and Development) diagram illustrated in Figure 2.17.

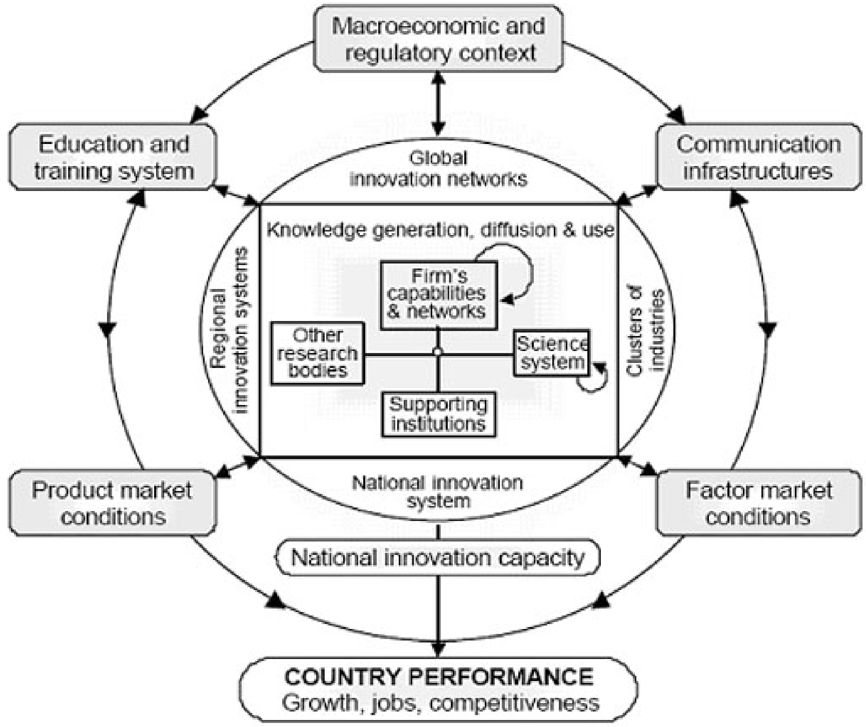


Figure 2.17- Actors and linkages in the innovation system (Source: OECD, 1999)

The tourism industry is often said to be less innovative than other industries (Hjalager, 2002, 2010; Tetzschner and Herlau, 2003). Successful innovation is that which is also profitable to the tourism firm in a competitive market and increases the value of the product or tourism experience (Weiermair, 2006). Nowadays, the globalization of cultures and food both encourage social innovation in response to tourism. For example, where powerful destination influencers encourage the 'freezing' of cultural characteristics and manifestations in order to show tourists lifestyles and culture as visitor attractions, then technology and innovation are used to reinforce images of the past, in effect, establishing museums in order to exhibit spaces and the local culture of people for the sake of tourism. However, tourists' interest in local culture may reassert or reawaken local interest leading to cultural pride and revival (Burns, 2006).

Hjalager (2002) argued an appropriate sub-division of innovation into five categories: product, process, management, logistic and institutional innovation. In recent decades, geotourism, as a new marketing niche, needs innovative strategies to attract more tourists to geotourism destinations such as geoparks.

Geoparks through promoting geotourism and applying initiatives under the umbrella of Networks (Global Geoparks Network, European Geoparks Network, Asia-Pacific Geoparks Network, National and Local Geoparks Networks) try to popularize geological sciences, revive traditional culture, and promote local development (Farsani *et al*., 2010).

In 2007, Jonathan B. Tourtellot noted that the enemy of geotourism is sameness (Miller and Washington, 2009). Thus, innovative strategies have an axial role in attracting tourists toward geotourism destinations.

However, geoparks as ideal destinations for alternative tourism in rural areas are not an exception to that rule. In the following, some innovative activities in geoparks are summarized.

TERRAGAZE mobile, which is a portable multimedia system directed at geotourism and geosciences education, is an innovative technology in geoparks. This electronic geological guide was recently improved by GPS support. In some geoparks a multimedia guide is available for rent, while some bicycles in geoparks are equipped with TERRAGAZE (Baucon, 2009).

Providing a 3D virtual tour around the Adamello Brenta European Geopark (Italy) is another example of innovative technology in geoparks. The film has been made by means of the software 3D Real Time Exploration. This simulates a virtual flight over the protected area and visitors can visit the geosites. In addition, an MP3 audio guide is available for free download, and the visitors can transfer the file to their MP3 player or mobile phone (Ferrari and Mase, 2009).

Psiloritis European Geopark in Greece invited the artists and craftsmen from Germany, France, and Psiloritis area to exchange ideas and to increase the bonds between the management bodies of the Park and the local artists and craftsmen in order to create innovative strategies and products (Skoula and Fassoulas, 2006).

Casa do Forno, as a family-rural accommodation and geo-bakery, joined the local network of partners from Naturtejo European Geopark (Portugal). They also have a close collaboration with geopark authorities. Casa do Forno has created some geo-products (local products which are symbols of, and provide information on geological heritage such as trilobite cakes and Orogenic toasts) as innovative products. Naturtejo Geopark has permitted them to use the geopark logo for their geo-products (Geraldes and Ferreira, 2009).

The establishment of the geo-restaurant *Petiscos & Granitos* in Monsanto historical village is an innovative activity in Naturtejo European Geopark territory (Portugal). This village is situated on the slopes of a granite inselberg, where the houses were built in the middle of giant boulders. It is worth mentioning that the restaurant includes a granite cave and serves a Geo-Dinner during events (Rodrigues and Carvalho, 2009).

Development of thematic visits in Naturtejo Geopark is one more innovative strategy in this territory. Concerning this, a mine trail was built in this geopark. This walking trail is the starting point for the development of a centre of geo-mining interpretation for the region of Idanha-a-Nova (Rodrigues *et al*., 2010).

Developing a geopark trails network which is also equipped for disabled visitors is another innovative strategy in Beigua Geopark (Italy). Horse riding can be done in some parts of trails, and a facility for learning “orienteering” has been created. Establishing a small geo-logical laboratory for children and an audio-visual hall are other strategies in order to transform natural heritage into sustainable development. In addition, the geopark, with the aim of enhancing the touristic success of the geopark, is organizing a new project called “Beigua Card”. The owner of this card can take advantage of a series of special offers and discounts in different commercial activities of the geopark (Burlando, *et al*., 2011).

Establishment of brine swimming pools and salt baths in Subbetica Geopark (Spain) is another geo-innovation offered to inhabitants and visitors of this geopark (Arroyo and Barquero, 2010).

Furthermore, a twinning agreement between geoparks is another innovative approach for better management of geoparks.

Organizing twinning projects, twinning exhibitions in rural areas of two geopark territories and twinning thematic courses for universities of two geoparks can be strategies for promoting geotourism, culture, commerce and sharing knowledge. Twinning agreements and sister partnerships between geoparks are starting points for close cooperation between geoparks.

For instance, Stone Forest Global Geopark (China) and Xingwen Global Geopark (China) have many similarities in some aspects, including geological formation and structure, so signing the twinning agreement was quite beneficial to their mutual learning and common development (GGN, 2009).

Sa *et al.*, (2010) provide an overview of a twinning agreement of cooperation between Arouca Geopark (Portugal) and Araripe Geopark (Brazil). This collaboration allowed the Brazilian team to improve their knowledge about the management of a geopark as project of sustainable development.

Owing to the establishment of transboundary geoparks – such as Novohrad-Nógrád Geopark, located in the border of Slovakia and Hungary – the authorities of the geopark launched a project title " how to organize a transboundary geopark" which can be a new model of geopark management (Loska, 2011).

In addition, in 2007 Lushan Geopark (China) and Bergstrasse-Odenwald (Germany) implemented a partnership in a wide range of topics like the development of geotouristic products, management, visitor services, infrastructure, geo-education and public information. Regarding this, they prepared panels with information about both geoparks in three languages (Chinese, German and English), and established a common geopark booth in fairs (Weber *et al.*, 2010).

Kanawinka Geopark includes landscapes according to the period and type of eruption, including Australia's youngest volcanoes, highly accessible volcanic cave systems, off-shore volcanic islands, remains of coastal volcanoes, and extensive systems of craters, lakes, and wetlands. In order to educate visitors a geology room is designed for them in the geopark visitor centre where the visitors can enjoy seeing and hearing the erupting neon volcano. Moreover, organizing a walking tour in glass floor cave is another innovative activity in Kanawinka Geopark (The Lady Nelson Centre, 2009).

Using sustainable energy to reduce air pollution is a sustainable innovative strategy applied by Naturepark TERRA.vita (Germany). E-bikes are equipped with an electric motor to ease biking in hilly areas. About 25 to 30 recharging stations are installed along the trails. The stations are equipped with a solar panel to provide carbon-free energy for the bike batteries (Escher, 2010).

Regarding conservation and sustainable use of mushrooms and truffles in Andalucía, a mycological garden was established in Sierras Subbeticas Geopark (Spain). This centre includes exhibition rooms, a microclimatic room of living mushrooms, audio-visual room, laboratory, library and mycological herbarium; the garden opened to the public in January 2011 (Arroyo and Barquero, 2011).

Establishment of the *Beja* garden geological time trail, focussing on the geological formation of south Portugal, from Precambrian to Quaternary, is a further innovative strategy for promoting geotourism, which developed by *LNEG* and *Beja* Municipality (Matos et al., 2011).

Furthermore, mud therapy, pelotherapy, geo-wine – "like *Terras de Lava*, *Magma, Basalto, Lajido, Pedras Brancas*" – labelled from volcanic products, geo-cooking – " *Cozido* *das Furnas*" – volcanic taste, and geo-poems are production innovations in the aspiring Azores Geopark, Portugal (Rocha *et al.*, 2011; Nunes, *et al*., 2011).

With the purpose of highlighting innovative activities in geoparks, chapter 4 will focus on geopark introduction, one by one, and will explain about innovative strategies which are applied by geoparks and in chapter 4, part 2, on the basis of Hjalager's (2002) definition of innovation, the innovative strategies in geoparks will be described in the frame of the five categories (production innovation, process innovation, management innovation, logistic innovation, and institutional innovation).

2.13. Geopark Networks: An Innovative Approach

According to Hjalager's definition (2002) collaborative structures and authority systems belong to the category of management innovation; thus, nowadays, collaboration in the form of Clusters or Networks (horizontal or vertical) is recognized as innovation in management, especially in rural development.

Knoke and Kuklinski (1983:12) explain networks as "a specific type of relation linking a set of persons, objects or events". Porter (1998:78) describes clusters as "geographic concentrations of interconnected companies and institutions in a particular field, linked by commonalities and complementarities".

Novelli *et al*. (2005) noted that networks and clusters as a framework can provide small and medium-sized enterprises (SMEs) with innovative opportunities to operate in a competitive tourism environment. Most countries such as Italy, Belgium, France, United Kingdom, Denmark, The Netherlands, Austria, Germany, Switzerland, Spain, and Australia apply network and cluster projects as management innovation. It is worth mentioning that Italy's clusters are widely spread and are part of the traditional economic process with no legislation in place.

Berda *et al*. (2006) argued that tourism in Europe is dominated by small and medium-sized enterprises (SMEs) and most of them are in the form of family-owned businesses. She supposed that these kinds of businesses can stimulate competition and play an important role in creating job opportunities and the development of the local economy; however, globalization has led to a growing pressure on them. From the other point of view globalization provides an opportunity to benefit from the open world market. The emergence of tourism clusters, the establishment of networks and strong partnerships among private sectors, and between public and private sectors are examples of benefits.

Lowe et al. (1995) described that interconnection between areas and networks as an important factor in rural development.

Network activity in rural areas of Wales (United Kingdom) increased economic activities and sustainability at a local level (Day, 1998). Murdoch (2000) noted that the network approach in rural areas as a new paradigm of rural development is useful because it links together the development issues which are internal to rural areas with problems and opportunities that are external.

Australia's rural areas, with the intention of solving challenges in social, economic and environmental terms (irrigation and dryland salinity, soil erosion, soil acidity, water quality, and pest animals and plants), established local networks named the Landcare Network, Holbrook Network and Woady-Yaloak Network. For the purpose of improving network activity each network tries to apply a strategy. For instance, the Landcare Network fosters new ways of communicating across the area. Moreover, the Holbrook Network opened a tourist information centre in the main street to facilitate the exchange of information about Landcare issues in the district. The Woady-Yaloak Network also organizes bus tours for visiting groups such as schools, universities, agency staff, sponsors and politicians. In addition, the networks increased the effectiveness of volunteers in rural areas (Sobels *et al*., 2001).

The Schist Villages Program (Portugal) was implemented in 2001 by the Commission for Coordination and Regional Development Centre (CCDRC). This program involved twenty four villages and was aimed at rural development. Regarding this, they established a local network, rural accommodation, and designed a logo for use with local products. Organizing tours, preparing a calendar and opening a shop "Loja do Xisto" (for supplying local products) were other activities for local development through tourism (Agência Desenvolvimento Turístico, 2008).

According to Lee *et al*. (2005) the results of a European pilot project in rural areas of six different countries: Finland, Ireland, Italy, Norway, Scotland and Sweden, illustrated that fostering networks can have long-term beneficial results. Indeed, networks create opportunities for learning and local development (High *et al*., 2005).

High *et al*. (2005) believed that an informal structure in terms of networks and communities can be a strategy in rural development.

It can be said that the creation of networks is an important factor in rural tourism development. Engaging local communities in network activities can develop new products and service innovation as well as the generation of new social economic and intangible capital that can lead to a regional competitive advantage (Hall, 2005).

Based on the results of Romeiro and Costa (2010) in the Valle del Jerte (Spain) a rural tourism network helps to maximize the sustainability of employment and stimulate processes of social innovation. Furthermore, local networks contribute to the development of rural areas.

In the last decade, the establishment of three formal social-scientific networks (the Global Geoparks Network, the European Geoparks Network, and the Asia Pacific Geoparks Network) are a novel paradigm for rural development.

According to Zouros (2004) and Zouros and McKeever (2009) the European Geoparks Network was set up by four regions located in rural areas of different European Countries – France, Germany, Spain, and Greece – to reduce problems such as slow economic development, unemployment, and a high level of emigration. After that in 2004, the Global Geoparks Network was set up.

Both networks aim at popularizing geology, developing the local economy, exchanging information, sustaining cultural identity and preserving geological and biological heritage.

Apart from the UNESCO Global Geoparks Network (GGN), European Geoparks Network (EGN), and Asia Pacific Geoparks Network (A.P.G.N) activities, some countries such as Japan, France, Germany, Italy, Ireland, Greece, and China have developed national and local geopark networks to create close collaboration between geoparks and tourism sectors, schools, universities, and businesses. The establishment of the German Geoparks Network, Italian National Geoparks Forum, Ireland Geoparks Forum and Greece National Geoparks Forum are examples of network activities in geopark territories on a smaller scale – country scale – which follow the rules of, and provide assistance to, the continental networks that nowadays constitute the Global Geoparks Network.

Recently, the Taiwan Geopark Network was set up to promote the concept of geoparks, to exchange the experience of management of the sites and to educate visitors to protect the landscape for the purpose of sustainable development and promoting economic activities (Lin, 2011).

Thus, it can be said that the European Geopark Network and the UNESCO Global Geoparks Network introduced the network concept to geo-sciences and geotourism. The establishment of geopark networks enables the exchange of ideas, experiences, and best practices, thereby helping each other to fulfil their common goals: conservation of natural, geological and cultural heritage, education, and development of the local economy through geotourism.

Moreover, national and local networks not only provide an opportunity for exchange of knowledge, but also encourage the locals and private sectors to participate in geopark activities.

Whereas the private sector and small and medium-sized enterprises (SMEs) in villages such as family businesses only undertake innovation if it promises to be profitable, Geopark Networks provide opportunities and possibilities for rural small and medium-sized enterprises (SMEs) to apply innovation. For instance, if a local businessperson or producer joins the geopark local network as an open economy model, she/he can take advantage of the recommendation of geopark authorities for creative innovation, together with the usage of the geopark brand for local products which are related to geopark activities, besides the possibility of being introduced to other geopark markets, at a national and international level. Furthermore, under the umbrella of the network, local businesspeople become stronger and more profitable. They also become eager to apply innovation.

Geoparks as new tourism destinations, through promoting geotourism and applying initiatives under the umbrella of Networks (Global Geoparks Network, European Geoparks Network, National and Local Geoparks Networks) try to popularize geological sciences, revive traditional culture, and promote local development (Farsani *et al*., 2010).

2.14. Summary and Conclusions

Based on the results of literature review, geoparks and geotourism are new recent subjects, so geopark activities have not been studied thoroughly yet. This study tries to introduce geoparks as new tourism destinations.

According to the literature reviews geoparks follow three targets (education, conservation and geotourism) and innovative strategies are key factors to attain these goals (Figure 2.18).

As Figure 2.18 illustrates geomorphological and geological assets can also have a socio-economic value if they can be used for geotourism purposes. Nowadays, creation of geoparks not only preserves geo-heritage but promotes the local economy through geotourism as a niche market.

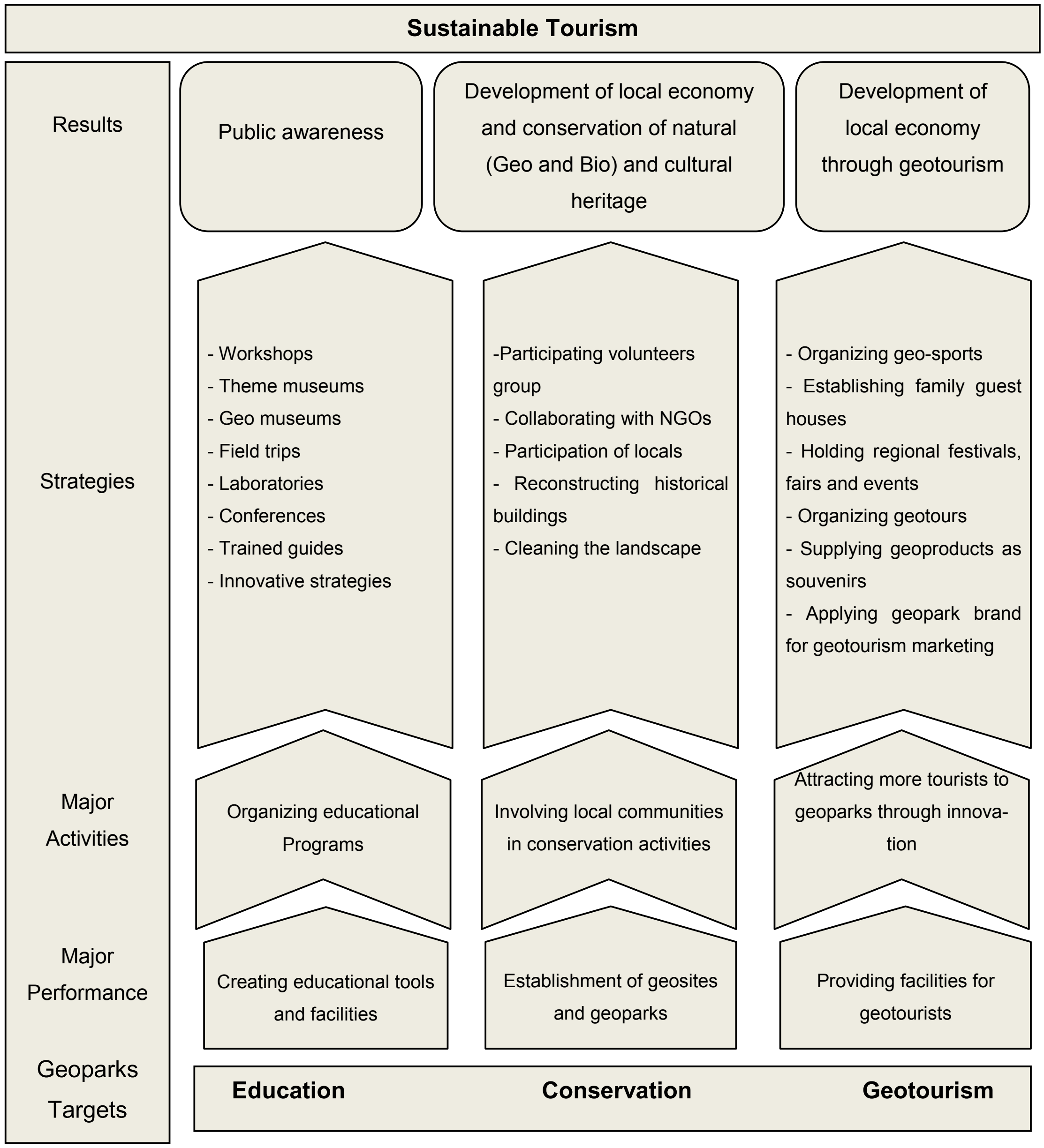


Figure 2.18- The summary diagram of geopark activities (Source: own construction)

Geotourism is one of the core activities of geoparks which are under the umbrella of geographic tourism. It is obvious that development of the local economy would occur as a result of tourism activities. Moreover, geoparks are pioneers in the development of geotourism; they strive to stimulate socioeconomic activities and sustainable development by attracting an increasing number of visitors. Regarding this, geoparks have applied innovative strategies and facilities such as making geo-products, organizing geo-sports, establishing rural accommodation, providing geotourism maps, establishing geopark museums, and geo-sightseeing (Figure 2.19).

Consequently, geoparks are key factors in geotourism development and they maximize geotourism to the benefit of the local economy and educate people about the evolution of their local landscape. Geoparks encourage local enterprises and cottage industries to get involved in geotourism and geo-marketing.

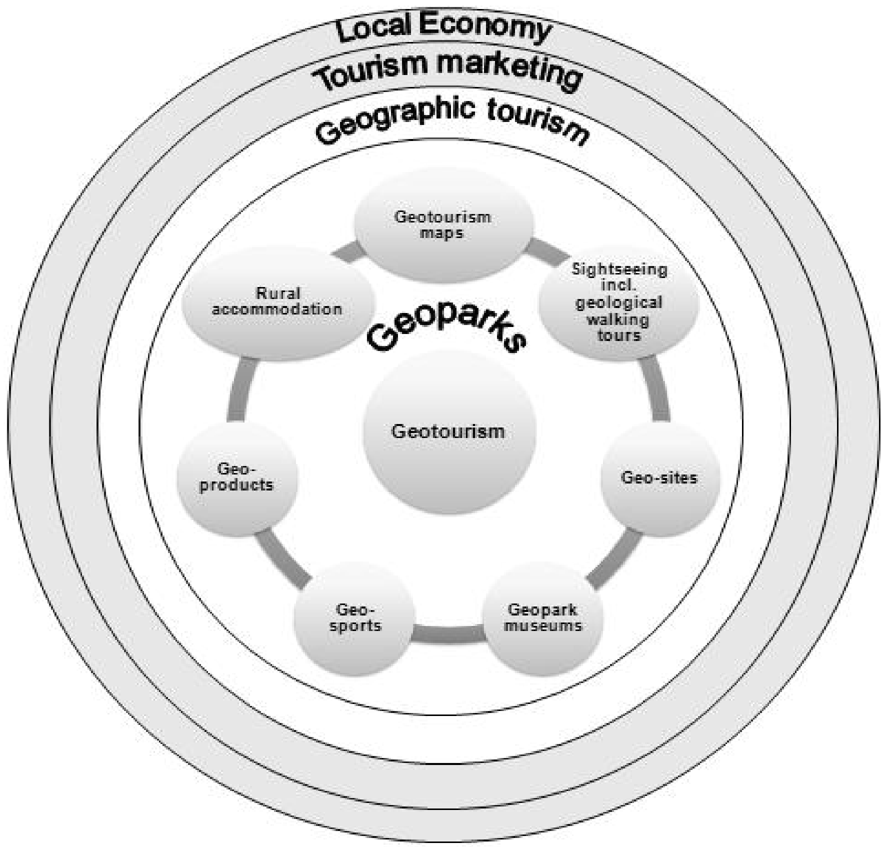


Figure 2.19 - Relationship between geoparks, geotourism and local economy
(Source: own construction)

CHAPTER 3- Methodology of Empirical Study

3.1. Introduction

While previous chapter consist of a literature review dealing with relevant concepts, the present chapter discusses and summarises the way in which the research process was carried out. The combined methods were used in this study. Using local and international data, this study was designed to investigate the role played by geoparks for rural development. The aim of the research is to assess innovative strategies of geoparks to improve geotourism as a gateway for the local development in rural areas.

This chapter starts with the hypotheses, followed by the specification of methodological procedures suggested for testing them (Figure 3.1). Moreover, this chapter presents some considerations on selecting international data (section 3.5.1), followed by the local data collection and analysis (section 3.5.2).

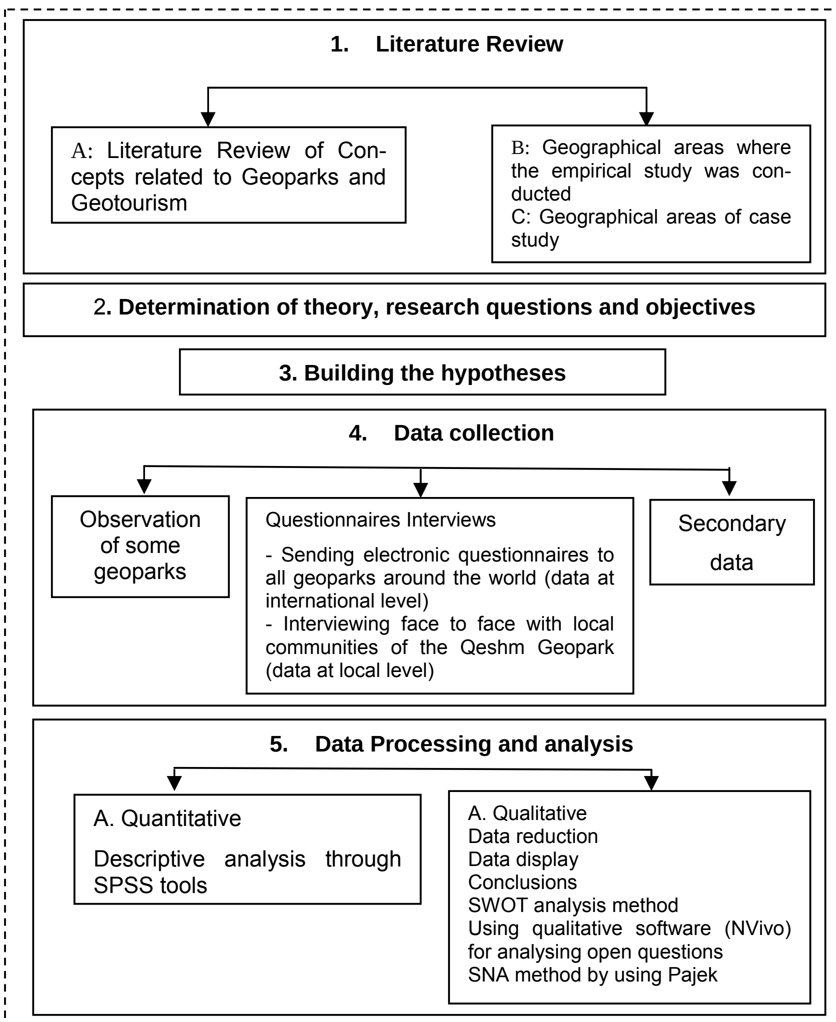


Figure 3.1- Stages of the research process (Source: own construction)

3.2. Research Methods for Leisure and Tourism

There are essentially three main styles of research in the social sciences that researchers in leisure and tourism can call upon and use (Finn *et al.*, 2000).

The survey method depends on a sample of respondents replying to a number of questions that have been previously determined as related to the research. By using the same questions for the selected sample of respondents, individuals in the sample may be compared. Data can be collected through an interviewer-administered questionnaire or a self-completion questionnaire. Surveys have the most important advantage of collecting a lot of information in a relatively short period of time. The survey can be used deductively by testing hypotheses, or inductively by looking for patterns in the data. It is the most common type of research style used by researchers in leisure and tourism.

The experimental method is less common in leisure and tourism research. Ethnographic research involves a method of investigation where a culture is observed in its natural setting. Ethnographers study the complexity of social interaction as indicated in daily life (Finn*et al*., 2000).

This study focuses on the survey method in the format of a case study. The case study method is one of several ways of doing social science research. The type of research questions posed plays an important role in selecting a method. In general, case studies are the preferred strategy when “how” or “why” questions are being posed. It is noteworthy that a basic categorization scheme for the types of questions is the familiar series: “who”, “what”, “where”, “how”, and “why” (Yin, 2003). The main question of the study presented in this survey is how geoparks and geotourism can contribute in sustainable tourism. As “how” questions were designed in research questions, the case study method was selected for this thesis. This survey tries to explore the policies and new strategies (innovation) pursued by the local government of geoparks in achieving the goals of sustainable tourism for locals in rural areas.

3.3. Theoretical Framework and Hypotheses Development

3.3.1. Theory Justification and Applicability

Theory is applied as a guiding framework to help make clear and explain the research findings, and indicate the types of conditions under which the research has occurred. Thus, theory is a conceptual framework to help make sense of the research findings (Finn *et al.*, 2000).

Based on the literature review in previous chapter, the UNESCO declaration on geoparks as a new model of sustainable development and protection of nature has highly evolved the strategy of local communities' participation in protected and natural areas. It is stated that a geopark should aim for the development of the local territory and support local communities and products. Local communities should not be removed from the lands where they live, since the locals' knowledge, traditional arts and traditional style of life play a vital role in geopark management.

Geoparks and geotourism aim to develop the local economy in rural areas. According to McKeever and Zouros (2005) geotourism and geoparks claim to promote the local economy by sustainable tourism. Moreover, Zouros (2004) noted that the European Geoparks Network was established for solving problems such as slow economic development, unemployment, and a high level of emigration in rural areas of four countries (France, Germany, Spain, and Greece). Since local communities in rural areas are compatible with local custom and natural resources, for developing tourism, officials should pay particular attention to sociocultural and socio-environmental impacts of tourism on local communities. Regarding this, the author built a research question–How can geoparks and geotourism contribute in sustainable tourism?–to find out the policies and innovative strategies pursued by local government of geoparks in achieving goals of sustainable tourism for locals in rural areas. The empirical study–through sending electronic questionnaires to all geoparks around the world–strives to highlight the role played by geoparks for the conservation of natural heritage, development of the local economy and sociocultural sustainability in surrounding villages of geoparks. In addition, interviewing local communities in Qeshm Geopark (Iran) reveals the local communities' ideas about geotourism expansion and establishment of a geopark in their territory.

3.3. 2. Motivation and Objectives

Arising from a personal interest in geology and geomorphology, this study was conducted after a realisation of the potential of geoparks as new geotourism destinations.

Indeed, very few people know or show interest in our geological heritage, and the fact that before establishing geoparks these potentials were not being developed or optimally utilised. This research tries to discover and to introduce innovative strategies which geoparks, as a model of sustainable development in protected areas, have applied for promoting geotourism, reducing the negative impacts of tourism on sociocultural components of local communities, conserving natural heritage, and developing the local economy in geopark territories. Lastly, the author would like to introduce geoparks and geological heritage as sustainable tourism destinations. The aims of the research and the key research questions are illustrated in Figure 3.2.

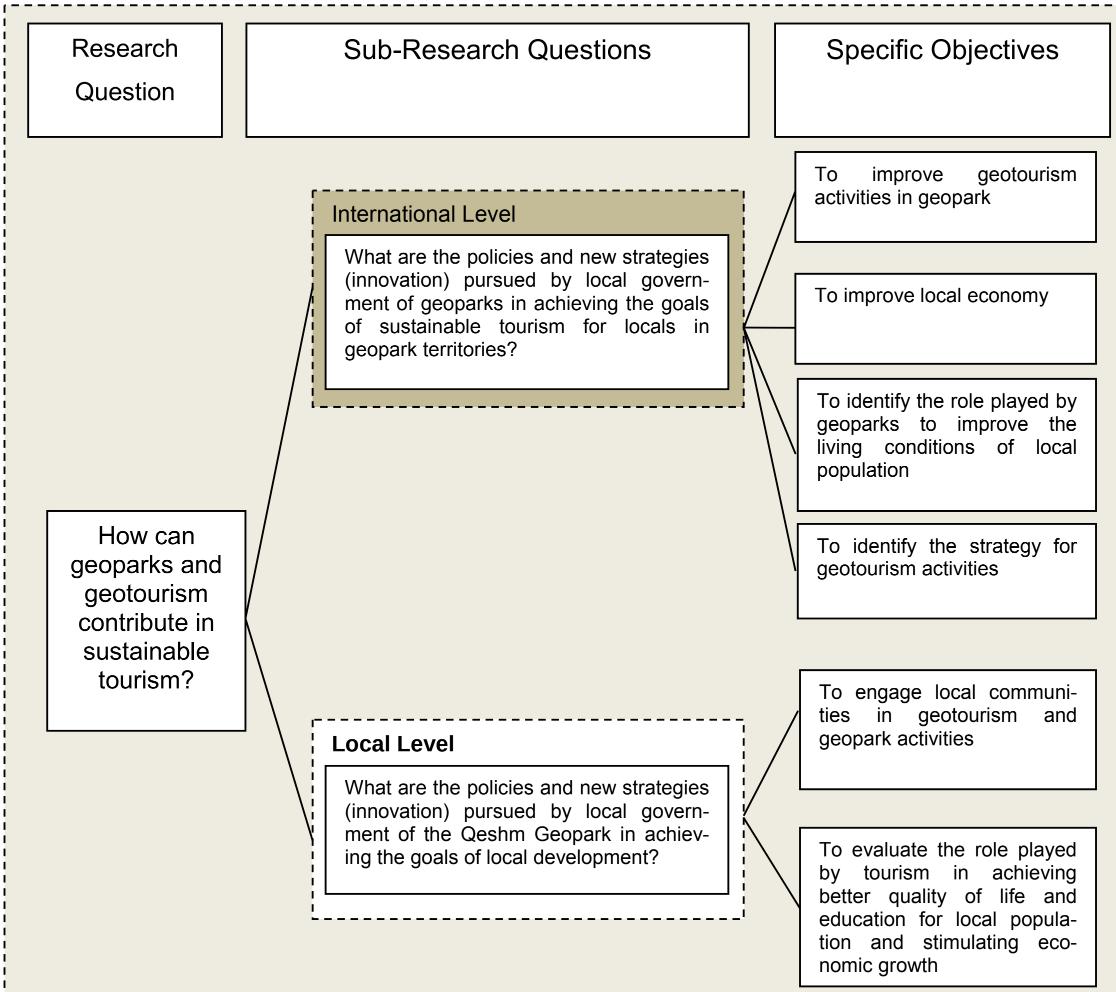


Figure 3.2- Objectives and key research questions (Source: own construction)

3.3.3. Hypotheses

A hypothesis is an unsure statement that proposes a possible explanation for some phenomenon or event and a useful hypothesis can include a forecast. Pizam (2005) noted that hypotheses are important, indispensable and powerful tools of scientific research. However, there are many things in the research that are not fully understood; hypotheses try to make them clear. For example the literature reviews in previous chapter illustrated that the United Nations Educational, Scientific and Cultural Organization

(UNESCO) introduced geoparks as a sustainable development model for participating local communities in geopark activities. Thus, the following hypotheses (Table 3.1) were built to highlight the role played by geoparks for the local development in rural areas and geopark territories.

Table 3.1 – Hypotheses (Source: own construction)

Hypotheses
H1: Geoparks involve local communities in conservation activities
H2: Geoparks have positive socio- environmental impacts on local communities
H3: Geotourism activities in geoparks create opportunities for local development
H4: Using geotourism can be a useful strategy for developing tourism in geoparks
H5: Geoparks contribute to promoting regional geotourism products and local products
H6: Geoparks promote geotourism through innovative strategies
H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories
H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by local communities
H9: Geoparks do not function similarly in terms of management
H10: Network activity in the EGN is stronger than in the GGN
H11: The majority of collaboration in GGN and EGN is concentrated in the field of exchange of knowledge and knowledge transfer

In order to test hypotheses two techniques were used. Firstly, two questionnaires were designed, one for local authorities of geoparks around the world and another for local communities of the surrounding villages of the Qeshm Geopark as a case study.

According to Almeida (2010) existence of a clear connection between hypotheses, questions and corresponding sections in the literature review can be a good strategy for materialization of research investigation.

Thus, the second technique (Table 3.2) was designed for creating a connection between hypotheses, sections and questions.

Table 3.2- Connection between hypotheses, questions and corresponding sections (Source: own construction)

Hypotheses	Questions	Sections
H1: Geoparks involve local communities in conservation activities H2: Geoparks have positive socio-environmental impacts on local communities	**Socio-Environmental sustainability** **Related interview questions at international level** • Does conservation of the geopark improve the local economy? • What are the conservation activities in the geopark? • How many people are involved in conservation activities? • Does the geopark have workshop facilities? • Are the workshops managed by locals? • Could you please explain about educational activities in your geopark? **Related interview questions at local level** • Does tourism have a negative impact on the local environment? • Is a community-based on conservation approach being applied to your area to encourage protection of natural area? • Are there some environmental benefits resulting from the geopark in your area?	2.10; 2.11; 2.11.1.1; 4.1.2.20; 4.1.2.25;4.1.2.26;4.2.1.3.1; 4.2.1.4.1;4.2.1.4.2; 4.2.1.4.3; 4.2.1.5.2; 5.1.4.4; 5.1.6.1.1; 5.1.6.1.2;5.1.6.2.1; 5.2.1.5;
H3: Geotourism activities in geoparks create opportunities for local development	**Socio-economic sustainability and promoting geotourism** **Related interview questions at international level** • What efforts are undertaken to promote links between the geopark and the local economy? - A label given to the regional services/products has increased the number of partnerships - Direct marketing of regional products is undertaken by your organization - Tourism offers include tours of collaboration with local businesses - Links with other local activates (boating, bird watching, cultural activities etc.) **Related interview questions at local level** • Does geotourism have a positive impact on the local economy?	2.4; 2.8; 2.10; 4.1.2.2; 4.1.2.3; 4.1.2.15; 4.1.2.16; 4.1.2.18; 4.1.2.22; 4.2.1.3.1; 5.1.6.1.1;5.1.6.1.2; 5.1.6.2.1; 5.2.1.4;
H4: Using geotourism can be a useful strategy for developing tourism in geoparks	**Geotourism and Geoparks as novel strategies in tourism** **Related interview questions at international level** • Does the geopark have close collaboration with the tourism sector? • Do visitors benefit the local businesses in geoparks through? - Buying entrance tickets - Participating in geopark tours - Buying souvenirs - Participating in workshops and conferences - Other • Do you count the visitors? • Do geoparks engage the locals as guides and park guards? • Are local people stakeholders in the tourism sector? • Does the geopark have a brand and logo of its own?	2.4; 2.7; 2.12; 4.1.2.2; 4.1.2.3; 4.1.2.4; 4.1.2.5; 4.1.2.7; 4.1.2.8; 4.1.2.9; 4.1.2.10; 4.1.2.11;4.1.2.12; 4.1.2.13; 4.1.2.14; 4.1.2.16; 4.1.2.17; 4.1.2.19; 4.1.2.20; 4.1.2.21; 4.1.2.22; 4.1.2.23; 4.1.2.24; 4.2.1.3.2; 4.2.1.3.3; 4.2.1.5.1;

Table 3.2- Connection between hypotheses, questions and corresponding sections (count.), (Source: own construction)

<table>
<tr><th>Hypotheses</th><th>Questions</th><th>Sections</th></tr>
<tr><td>H4: Using geotourism can be a useful strategy for developing tourism in geoparks</td><td>Does geotourism market take advantage of the geopark brand?
Related interview questions at local level
Do you desire to see an expansion of the tourist industry in your area?</td><td>4.2.1.3.3; 5.2.1.4;</td></tr>
<tr><td>H5: Geoparks contribute to promoting regional geotourism products and local products

H6: Geoparks promote geotourism through innovative strategies

H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by local communities</td><td>Socio-Cultural sustainability and promoting geotourism
Related interview questions at international level
Does the geopark promote regional food and craft products?
What efforts are undertaken to create and promote regional geotourism products of the geopark?
- Meals from regional and/or ecological products are available in restaurants
- The geopark organizes markets for regional and agricultural products
- A label for regional food products or local gastronomy exists
- Casts and souvenirs of local products are available in the geopark
- Local food is served on tours
- There are some initiatives in promoting food from regional and / or ecological products/or geotourism products

Related interview questions at local level
Socio-Cultural sustainability
Does tourism have a negative impact on the town/village socially?</td><td>2.8; 2.9; 4.1.2.1; 4.1.2.2; 4.1.2.3; 4.1.2.4; 4.1.2.8; 4.1.2.15; 4.1.2.16; 4.1.2.18; 4.1.2.21; 4.1.2.22; 4.1.2.23; 4.1.2.26; 4.2.1.2; 4.2.1.5; 4.2.1.5.1; 4.2.1.5.2; 4.2.1.5.4; 4.2.1.5.5; 4.2.1.5.6;5.2.1.3;</td></tr>
<tr><td>H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories</td><td>Socio-economic sustainability at international level
Does the geopark create second jobs or seasonal jobs for local communities?
How many employees work in the geopark (full time/ part time) and who pays them?
How many employees of geopark are locals?
Do the workshops improve the local economy?
Does brand play a role in development of local economy?
Education and raising awareness at international level
Does the geopark have workshop facilities?
Are the workshops managed by locals?
Education and raising awareness at local level
Do you know what a geopark is?
Do you know that Qeshm is a geopark?</td><td>2.10; 4.1. 2.2; 4.1. 2.3; 4.1. 2.4; 4.1. 2.10; 4.1. 2.11; 4.1. 2.17; 4.1. 2.18; 4.1. 2.20; 4.1. 2.22; 4.1. 2.23; 4.2.1.3.1; 4.2.1.4. 2; 4.2.1.4. 3; 5.2.1.6;</td></tr>
</table>

Table 3.2 - Connection between hypotheses, questions and corresponding sections (count.), (Source: own construction)

Hypotheses	Questions	Sections
H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories	**Socio-economic sustainability at local level** • Does the community depend on a single industry? • Is unemployment a problem in your local community? • Is the level of unemployment seasonal? • Are there some socio-economic benefits resulting from the geopark in your area? • Are you employed in the geopark or involved in geopark activities? • How much is your salary?	5.1.6.1.1; 5.2.1.4;
H9: Geoparks do not function similarly in terms of manage-ment	**Management Structure** **Related interview questions at international level** • How is the management structure of geoparks in your country? - Local government - Private administration - Both • Which organizations financially support the geopark in your country? - Municipality - Tourism department - Environment department and Municipality - Other • Percentage of employees who work in the geopark? - Full time - Part time - Both • Does the geopark cooperate with other or-ganizations and companies?	2.5; 2.6; 4.1.2.2; 4.1.2.3; 4.1.2.4; 4.1.2.5; 4.1.2.6; 4.1.2.7; 4.1.2.8; 4.1.2.9; 4.1.2.10; 4.1.2.11; 4.1.2.12; 4.1.2.13; 4.1.2.14; 4.1.2.15; 4.1.2.16; 4.1.2.17; 4.1.2.18; 4.1.2.19; 4.1.2.20; 4.1.2.21; 4.1.2.22; 4.1.2.23; 4.1.2.24; 4.1.2.25; 4.1.2.26; 4.2.1.3.1;4.2.1.5.3.1; 4.2.1.5.3.2; 4.2.1.5.5;
H10: Network activity in the EGN is stronger than in the GGN H11: The majority of collabo-ration in GGN and EGN is concentrated in the field of exchange of knowledge and knowledge transfer	With which geoparks does your geopark collaborate? And in which area?	4.2.1.5.3.1; 4.2.1.5.3.2.

3.4. Description of the Techniques for Leisure and Tourism

3.4.1. Quantitative and Qualitative Research

At one level it is very easy to make a distinction between quantitative and qualitative research. Denzin and Lincoln (1994) noted that qualitative researchers believe that rich descriptions of the social world are valuable, whereas quantitative researchers are less concerned with such detail. The quantitative paradigm has been the main and accepted research tradition in many fields of leisure and tourism.

According to Finn *et al.*, (2000) quantitative research is classified as an empirical research where the data are in the form of numbers, and qualitative research where the data are not in the form of numbers. The quantitative technique is a rigorous scientific method and the qualitative research is less rigorous and employs more flexible tools of investigation. In addition, quantitative researchers can reach large numbers of people by clarifying reality, whereas qualitative researchers deal with the complexity of reality but with more limited numbers. The difference between qualitative and quantitative research is demonstrated in Table 3.3.

Table 3.3 -Difference between qualitative and quantitative research

(Source: Winchester, 2000)

Qualitative method	Quantitative method
Qualitative data	Quantitative data
Natural setting	Experimental setting
Search for meaning	Identification of behaviour
Reflection of natural sciences	Adoption of natural resources
Inductive approach	Deductive approach
Identification of cultural patterns	Pursuance of scientific laws
Idealist perspective	Realist perspective

Hasse (2001) focused on community participation and stakeholder collaboration in tourism planning. In his study, data analysis was used by combining methods, firstly the qualitative analysis computer software package NVivo was utilised to systematize the grounded theory. Secondly, the quantitative method was applied to analyse the questionnaires of the community and visitor survey by means of software program Excel. The third part of the analysis was the design of PAGIS to represent the spatial data collected.

In the present thesis in order to increase the validity of the research, the data analysis was also carried out by means of the NVivo software. The qualitative software NVivo is a useful tool for performing qualitative researches. It is used in this study to analyse the open questions. These open questions introduce the strategies for the conservation of geoparks.

Stone (2002) through qualitative analysis sought to assess the current status of ecotourism at two destinations where it is being promoted as a regional development strategy. Two National Parks (Jianfengling and Diaoluoshan National Forest Parks, in Hainan Province, China) were selected for his investigation. Finally, ecotourism has been identified as an important provincial strategy for balancing economic growth and conservation in two case studies.

Lepp (2004) by using a qualitative method in his thesis attempted to determine the impact of tourism in Bigodi (East Africa); Bigodi village is located next to Kibale National Park. Residents identified several benefits of tourism: money, improved agricultural markets, communal benefits and the idea that tourism benefits can arrive by chance.

As mentioned in Figure 3.2 one of the aims of the present study is to identify the role of geoparks in socioeconomical sustainability in rural areas.

The thesis of Saule (2004) is based on in-depth interviews with representatives of tourism service suppliers and local tourism and development agents. The goal of the aforementioned research is to find out how tourism can be used as a tool for local development. Aside from qualitative analysis, the SWOT method was used to determine the strengths, weaknesses, opportunities and threats of the territory that can have an influence on tourism in Haute-Corrèze (France).

With SWOT analysis, experiences gained from different geoparks, and the results of descriptive analysis helped the present thesis to recommend new strategies which reduce the negative impacts of tourism in the Qeshm Geopark territory, Iran.

After gaining experiences from geoparks around the world by means of a literature review and questionnaires, in order to promote better management of the Qeshm Geopark (Iran), as a case study, the SWOT analysis method used.

A Yellow Card was issued for the Qeshm Geopark activities illustrating that the Qeshm Geopark activities are not sufficient. SWOT analysis method was used to investigate the Strengths, Weaknesses, Opportunities, and Threats of the Qeshm Geopark. Lastly, SWOT matrices were designed for geosites, ecological-sites, and cultural and archaeological heritage sites of the Qeshm Geopark.

Hunter (2006) used a qualitative-interpretive paradigm to investigate the transference of sustainable tourism theory to practice by examining the extent to which the sustainable tourism planning philosophy is utilised in the planning practices of local tourism destinations in Queensland (Australia). Moreover, the study developed a theoretical framework to facilitate the application of sustainability principles to local tourism destination planning. The findings illustrated in all cases investigated that the local government was also the driver of the planning process, and as such responsible for the fact that sustainability principles did not support the process. While studies have discussed the fact that sustainability depends on the agendas of stakeholders, particularly the local government, this study has added the idea that due to local governments' considerable influence, the adoption of sustainability principles is also linked to the concept of power. The study therefore adds a further dimension to the sustainable tourism debate, that stakeholder influence and power can be the determining factor in the adoption of a sustainable approach to tourism planning.

With regard to the role of the local government as a determining factor in implementation of principles of sustainable tourism, in this study a questionnaire was designed for local governments of geoparks to seek geopark strategies for sustainable tourism.

Schellhorn (2007) by using combined methods (qualitative and quantitative) examined the effectiveness of tourism as an agent of rural development, focusing on culture and nature-based destinations in the 'developing world'. The study was carried out in the village of Desa Senaru at Gunung Rinjani National Park in Lombok Island, Indonesia. Based on the results, an increased quality of life the village of Desa Senaru depends on a healthy environment, and hence requires a light ecological footprint. By reducing dependency on scarce resources, integrated development supports bio-diversity conservation.

It is worth mentioning that some questions in this study strive to draw attention to the role played by geoparks for minimization of negative environmental impacts of tourism in the surrounding villages of geoparks.

Jiang (2008) chose a qualitative method for collecting data; the study was conducted in Tengtou village, China, and she attempted to investigate the role of active involvement of local people at different levels of ecotourism. Her findings illustrated that involvement of local people is an important factor in sustainable development.

Furthermore, Schweinsberg (2009) applied combined methods (qualitative and quantitative) to assess the role of tourism as an agent of sustainable change in rural Australia. Based on the findings of his thesis, tourism sustainability in forest regions of Australia depends on the appreciation of local participation.

Regarding the key role of the local involvement, this thesis is specifically concerned with the effect of establishment of geoparks on the participation of local communities in geopark activities.

Boley (2009) by using Geographic Information System (GIS) and reviewing the quantitative methods utilized in designing the survey instrument, pilot testing the instrument, collecting the data, and analysing the results strived to introduce a geotourism map guide as a new educational tool for guiding geotravellers in the region of northwest Montana, southwest Alberta, and southeast British Columbia. The purpose of this study was to take the definition of geotourism provided by National Geographic and create a reliable and valid instrument capable of measuring geotouristic tendencies.

3.4.2. Combined Methods

Quantitative research is related with the hypothetico-deductive method of theory testing, and the qualitative method tries to find models in the data to inductively generate theory; but this is not set in stone. Methods using quantitative data can be used to generate hypotheses and develop theory, and qualitative research can be used to test hypotheses. Therefore, some research questions may demand qualitative data, others quantitative or a combination of the two.

Finn *et al.*, (2000) argued that combining qualitative and quantitative technique can maximise the strengths and minimise the weaknesses of each method.

Thus, in this study a combined method was used to determine the role of the establishment of geoparks for local development. Apart from the qualitative and quantitative methods, the SWOT method was used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in the Qeshm Geoprak as a case study.

The social network analysis technique is another method used to examine the connection between members of UNESCO Global Geoparks Network (GGN) and European Geoparks Network (EGN). For visualisation relationships and clusters, the Pajek program was used.

Batagelj and Mrvar (1998) developed Pajek (http://pajek.imfm.si/doku.php?id=pajek) as a program for large network analysis. They addressed that supporting abstraction by factorization of a large network into several smaller networks. Providing the user with some powerful visualisation tools and implementing a selection of efficient algorithms for analysis of large networks are the main goals in the design of Pajek.

Scott and Cooper (2007) by using network analysis in the Pajek program succeeded in understanding the structure of the Australian tourism industry in two states and five regions; also they identified product clusters in the network.

In addition, Baggio et al. (2007) ran a project on the Island of Fiji and the Island of Elba in Italy to find out how network thinking can inform our understanding of interactions between tourism operators within a destination. In addition, the research discussed the use of the science and tools of network thinking to examine the structural properties of the network of hyperlinks between the websites of tourism operators in two destinations. In this regard the World Wide Web (WWW) is used to follow links from one page to another. Network analysis was applied in this study, and the results revealed the poor connectivity among the elements of the network.

Costa and Baggio (2009) reported a complex network- based systematic analysis of Elba (Italy) as a tourism destination. The Network Analysis method was used to calculate measurements. The results illustrated that the Elba network could benefit from increased integration.

Piao *et al*. (2010) used Pajek to visualise the agent relationships in the e-commerce transaction network as well.

3.5. Data Collection

The research methodology includes both primary and secondary research. The first phase consists of an extensive literature review of existing reports on geotourism and geoparks. Excluding the book of Newsome and Dowling (2010) titled “geotourism: the tourism of geology and landscape” the other books paid more attention to geological features in geoparks. But the aforementioned book brings together a range of geotourism case studies from a number of countries and highlights the geopark activities and the role of geotourism for local development.

The results of literature reviews and searching in scientific databases and Google Scholar demonstrate that the topic is new and geoparks and geotourism are a new subject recently, so geopark activities have not been studied thoroughly yet. Hence, data for this research was obtained from questionnaires.

Quantitative research as a hypothetico-deductive method testing is the main technique in this survey. A questionnaire-based survey in face-to-face format at the local level in order to interview local communities of the Qeshm Geopark and an e-survey at international level for the purpose of data gathering from the authorities of geoparks registered in UNESCO Global Geoparks Network were used.

An e-survey as a new category of questionnaire-based surveys (mail) emerged via the internet (Veal, 2006). In a second phase, the author focused on geoparks registered in UNESCO and on comprehensive collected information about geoparks and their strategies to improve geotourism and the development of the local communities, by sending electronic questionnaires to all geoparks. The questionnaire was completed using a WORD-processor and e-mailed back to the researcher. The empirical part of the second phase was conducted from March 2009 to January 2010.

Since network activity is an innovation in geopark management, another electronic questionnaire was sent to geoparks to find out fields of collaboration between geoparks. The data for this part of research were gathered from October to November 2010.

A questionnaire-based survey in face-to-face format (household survey and street survey) at local level was the third step for considering the role of geoparks for promotion of geotourism and the local economy. Data for the third part were collected from July to August 2009.

The statistical results in both levels were analysed by statistical survey in SPSS tool. Beside SPSS, some of the open questions were analysed by means of the qualitative software NVivo. Moreover, Pajek software was used for visualization of collaboration between geoparks.

It is worth mentioning that, beside the primary data, visitor numbers of geoparks as secondary data was used in this research.

3.5.1. Selection of the International Data

Observation was the first technique applied to gather information about the role of creation of geoparks for local development. Regarding this, three field trips were organized around the Qeshm, Arouca, and Naturtejo Geoparks.

In addition, interviews provide an opportunity for detailed investigation of each individual's personal perspective and for an in-depth understanding of the personal context within which the research phenomenon is found (Creswell, 2003). For better management of the case study the authors needed to get experiences from all geoparks around the world, since, as geopark and geotourism are new concepts, there were not enough related references. Also travelling to all geoparks was time consuming. Therefore two questionnaires were designed using a word-processor to attain the innovative strategies in geoparks to promote geotourism, cultural sustainability, natural conservation and socioeconomic activities.

To reach these goals in the first step the author will focus on geoparks registered in UNESCO and comprehensive collected information (by sending electronic questionnaires to all geoparks around the world (64) in 2009) (Appendix1) (Figure 3.3, and 3.4).

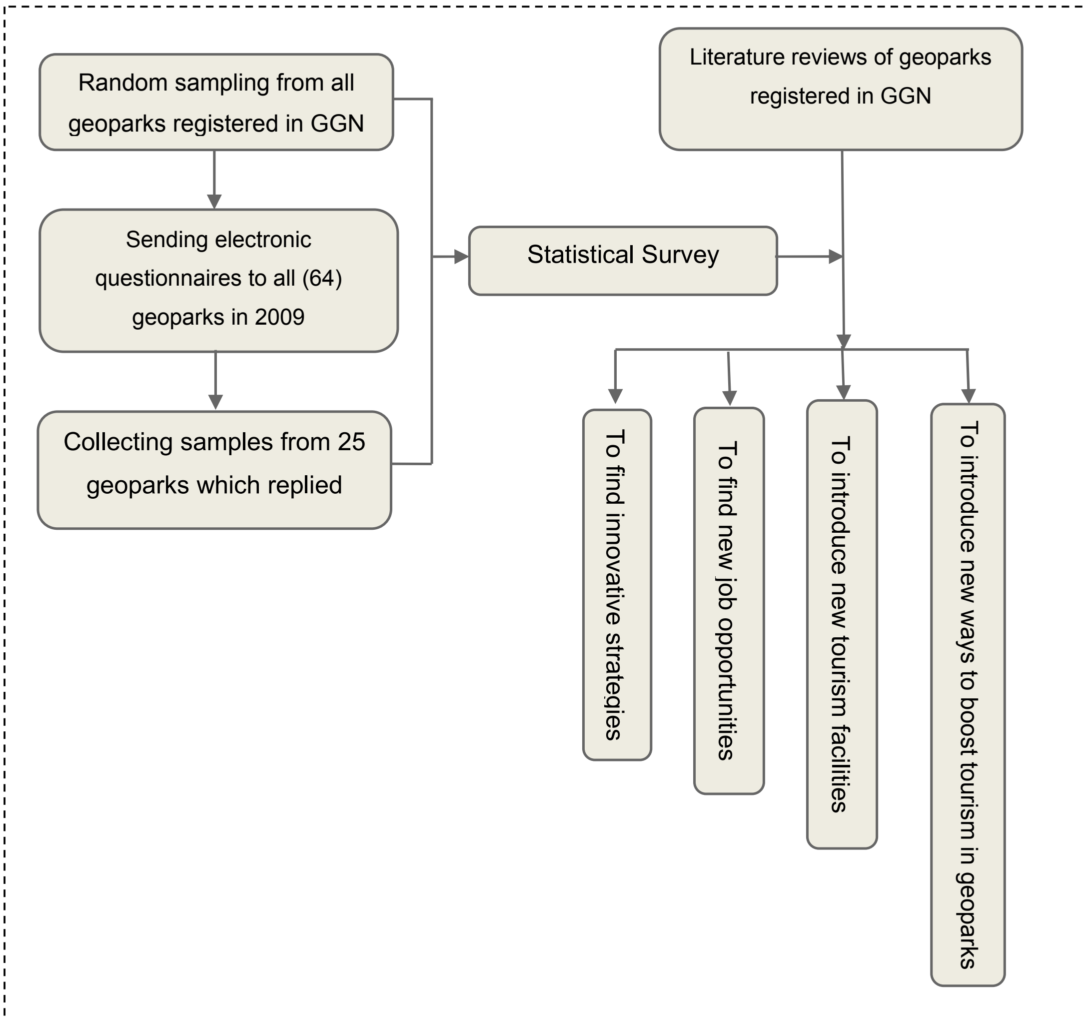


Figure 3.3- Modelling of phase 1 and 2 of methodology (Source: own construction)

The questionnaire was distributed to get information about geopark activities and their strategies to improve geotourism and the local development.

Twenty-five questionnaires were recollected after having been filled by the chosen respondents (Figure 3.4).

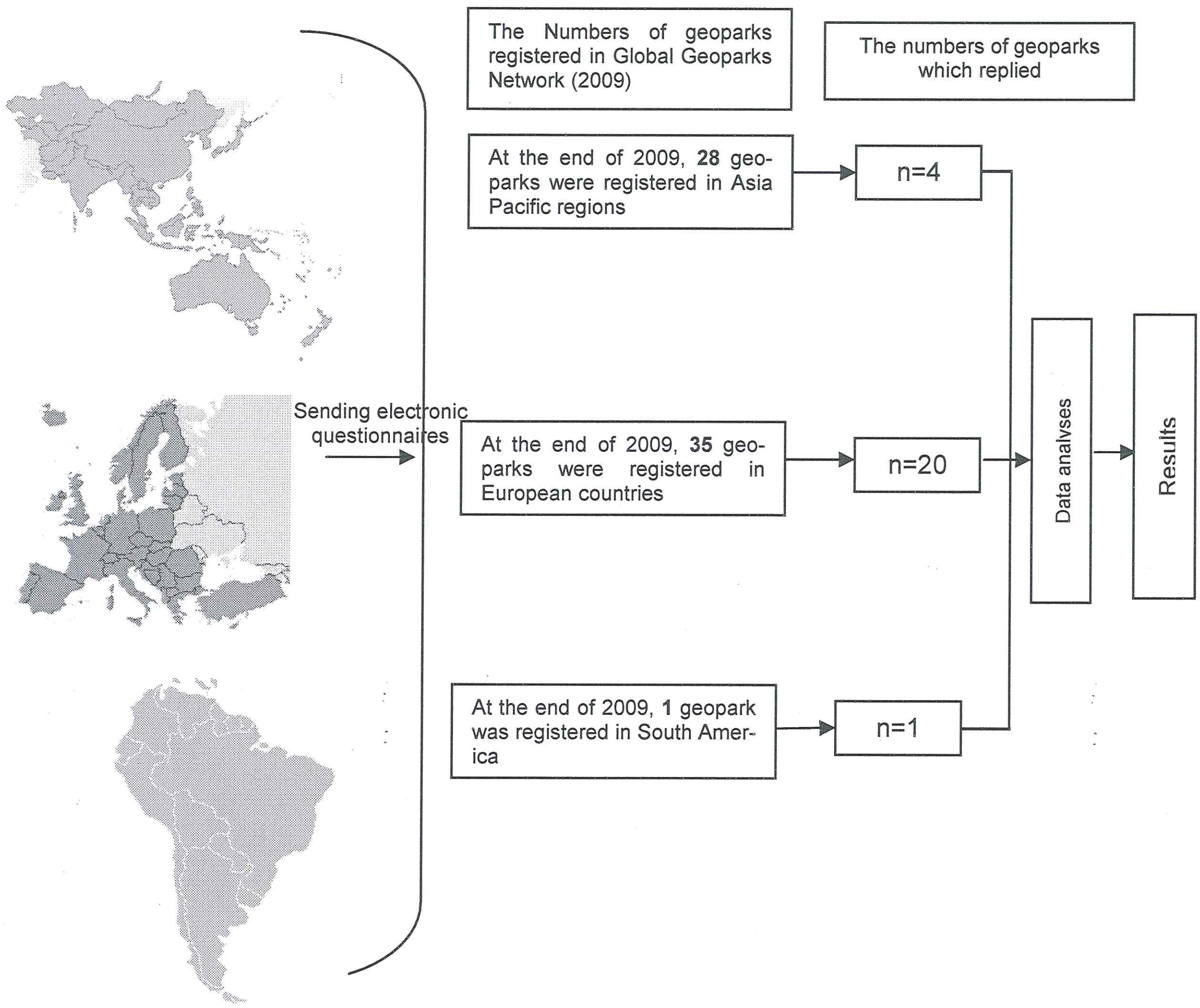


Figure 3.4- The numbers of geoparks that replied to the first questionnaire
(Source: own construction)

The respondents were in twenty-five geoparks around the world registered in the UNESCO Global Geopark Network. Data was gathered from March 2009 to January 2010. As Table 3.4 presents, the majority of responses were from Europe (80%), (Figure 3.5), and the others from Australia, Iran, Malaysia, Japan, and Brazil (Table 3.4).

As most countries follow a similar strategy in management planning of geoparks and officials employ network activities for implementation of geopark targets as well as establishing a local network for collaboration of geoparks, the author believes that the result of sampling can be generalized to all geoparks.

Attention should be drawn to the fact that all countries except China filled in the first questionnaires. Thus, if from a statistical point of view we exclude the Chinese geoparks (n=22) from the population (N=64), we end up with 42 geoparks registered in UNESCO. Bearing in mind that 25 questionnaires were sent back to us, it means, therefore, that the final response rate is increased to 59.5%.

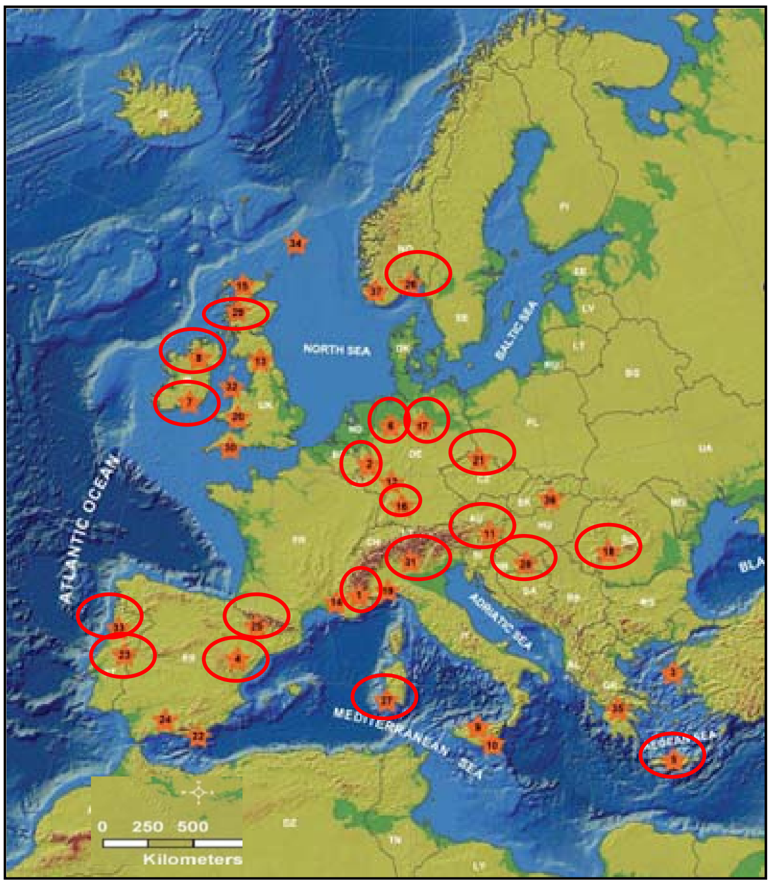


Figure 3.5 - European geoparks that replied to the questionnaires (by the end of 2009)

Table 3.4 - Geoparks that replied to the questionnaires (2009)

NO	Country	Geopark
1	Australia	Kanawinka Geopark
2	Austria	Nature Park Eisenwurzen
3	Brazil	Araripe Geopark
4	Croatia	Papuk Geopark
5	Czech Republic	Bohemian Paradise
6	France	RéserveGéologique de Haute-Provence
7	Germany	Vulkaneifel Geopark
8	Germany	Geo and Nature park TERRA.vita
9	Germany	Geopark Harz .Braunschweiger Land Ostfalen
10	Germany	SwabianAlbGeopark
11	Greece	Psiloritis Natural Park
12	Iran	Qeshm Geopark
13	Ireland	Copper Coast Geopark
14	Italy	Geological, Mining Park of Sardinia
15	Italy	Parco Naturale Adamello Brenta
16	Japan	Itoigawa Geopark
17	Malaysia	Langkawi Geopark
18	North Ireland	Marble Arch Caves Global Geopark
19	Norway	Gea Norvegica Geopark
20	Portugal	Naturtejo Geopark
21	Portugal	Arouca Geopark
22	Romania	Hateg Country Dinosaurs Geopark
23	Scotland	Lochaber Geopark
24	Spain	Sobrarbe Geopark
25	Spain	Parque Cultural del Maestrazgo

As mentioned in the literature review sustainable tourism has appeared to represent a set of principles, policies and management plan for future development of tourism marketing (Welford and Ytterhus, 2004). Sustainability is often referred to in terms of the metaphorical ‘triple bottom line’, referring to the consideration of social, environmental and economic targets (Figure 3.6).

Regarding this, WTO (1998: p.11) declared that tourism is sustainable when “*it improves the quality of life of the host community; provides a high quality of experience for the visitor; and maintains the quality of the environment on which both the host community and the visitor depend*”. According to section 2.3 in the literature review, the United Nations Environment Programme proposed a set of 18 core principles for sustainability.

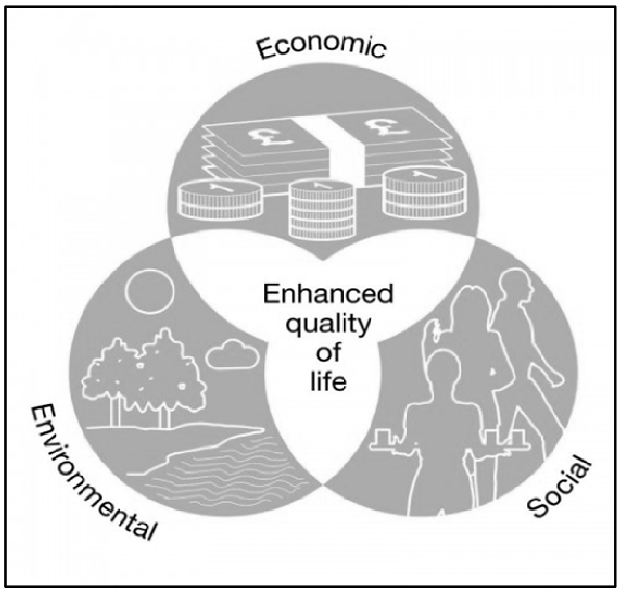


Figure 3.6- Triple bottom line (Source: Church, G.B, 2008)

There is widespread agreement for stakeholder participation, particularly that of the local communities, in sustainable tourism (Byrd, 2007; Yasarata *et al.*, 2010; Choi and Murray, 2010; Whitford and Ruhanen, 2010). It is evident from the questionnaires that this thesis also aims to discover how geoparks and geotourism can contribute to local involvement and local development. Regarding this, Figure 3.7 attempts to illustrate the connections between questions designed for geopark authorities and sustainable tourism.

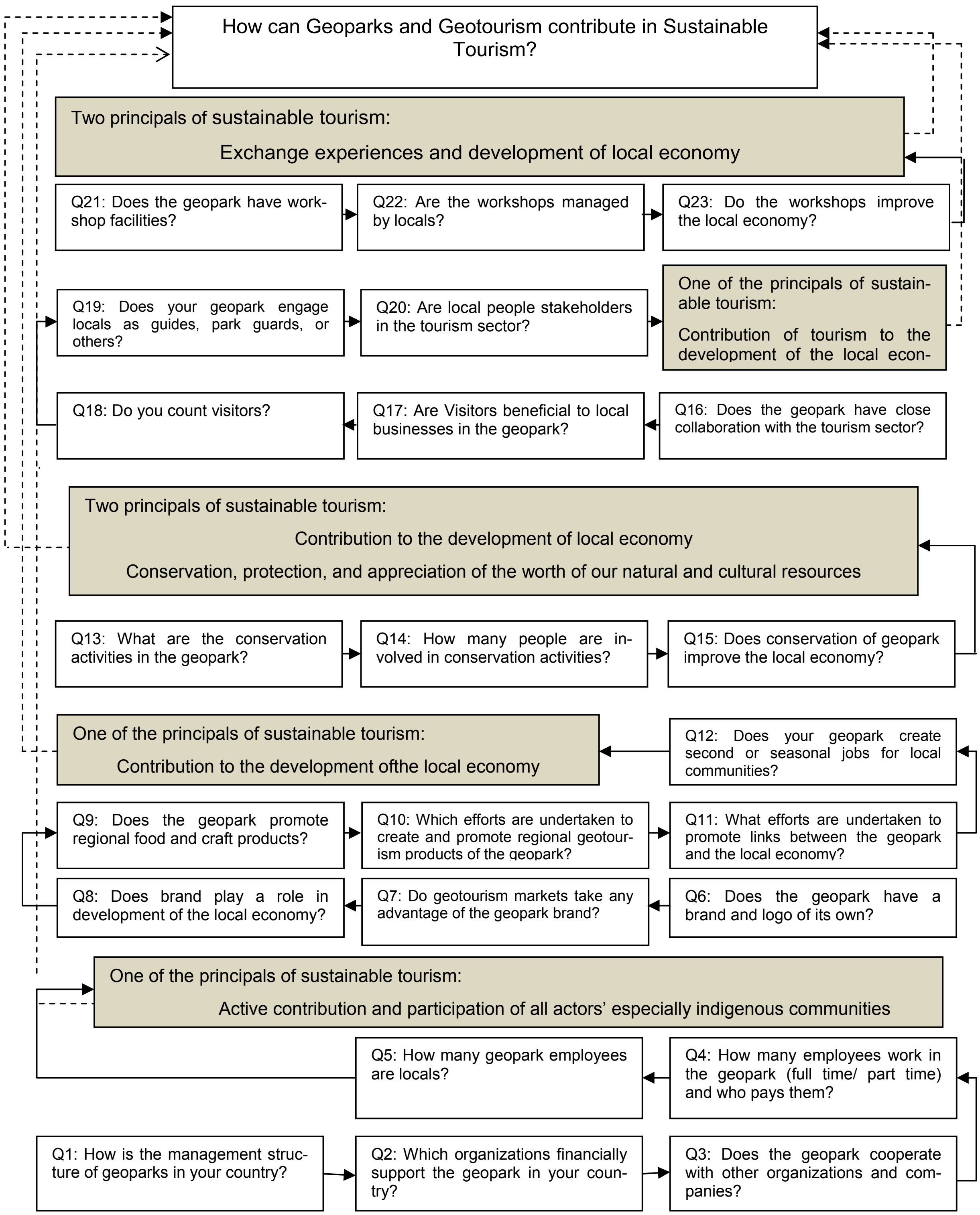


Figure 3.7 -Connection between questions of questionnaire and sustainable tourism, at international level (Source: own construction)

Questions 1 to 5 inquire into the awareness of management function in geoparks and also try to ascertain whether geoparks take advantage of local communities in their team work or not. Besides this, this part reveals the role of cooperation in geopark activities.

Perales (2002) noted that El Alto Palancia, within the Valencian region, using two brands, not only promotes environmental quality but also searches for the authentic in order to develop modern rural tourism. Moreover, Cai (2002) introduced privileges and immunities of cooperative branding, and illustrated that cooperative branding removes the limitation of geographic names related to individual cities and towns. Likewise, rural communities can especially benefit from cooperative branding. Rural tourism marketing through cooperative branding tries to promote individual rural communities and to increase the use of tourism resources and synergizing drawing power of their attractions. Consequently, brand marketing is indispensable in rural tourism (Yu-quan, 2007).

The European Geoparks Network and the Global Geoparks Network adapted a common logo. The members of networks can use the logos for their activities, publications or products related to geopark activities (Zouros and Mckeever, 2009).

It is evident from the literature review that rural tourism benefits from brand and logo promotion. Since, the majority of geoparks are located in the rural areas; questions 6 to 8 investigate the role of a geopark brand for development of the local economy and geotourism marketing.

Questions 9 to 12 aim at evaluating the role of geoparks for developing the local economy. These questions have three major purposes. Firstly, they want to demonstrate the effects of the creation of geoparks on promoting local crafts and products. It is worth mentioning that regional products and handicrafts are cultural identities and promoting them can be a strategy for sociocultural sustainability.

Secondly, these questions attempt to ascertain the role of geotourism marketing in the local economy in geoparks. Lastly, question 12 deals with entrepreneurship, in the form of seasonal and second job opportunities for local communities in geoparks.

Questions 13 to 15 investigate the participation of local communities in geoparks conservation activities. Questions 16 to 20 evaluate whether geotourism can be a useful strategy for developing tourism in geoparks?

As education and exchange of knowledge are targets of establishment of geoparks, questions 21 to 23 were designed to evaluate how geoparks, through organizing workshops, improve the local economy and increase public awareness of tourists and local communities about cultural identities and geological knowledge. It goes without saying that each educational activity follows the local development.

To give a more detailed description of the connection between questions and the main text of the thesis, table 3.5 was designed.

Table 3.5 -Connection between questions of questionnaire and main text, at international level (Source: own construction)

Questions	Sections
Q1: How is the management structure of geoparks in your country?	4.2.1.3.1; 4.2.1.5.3.1;4.2.1.5.3.2;
Q2: Which organizations financially support the geopark in your country?	4.2.1.3.1;
Q3: Does the geopark cooperate with other organizations and companies?	4.2.1.3.1;4.2.1.5.5; 4.2.1.5.3.1;4.2.1.5.3.2;
Q4: What is the percentage of employees who work in the geopark (full time/ part time) and who pays them?	4.2.1.3.1;
Q5: How many employees of geopark are locals?	4.2.1.3.1;
Q6: Does the geopark have a brand and logo of its own?	4.2.1.3.3;
Q7: Do geotourism markets take any advantage of the geopark brand?	4.2.1.3.3;
Q8: Does brand play a role in development of the local economy?	4.2.1.3.3;
Q9: Does the geopark promote regional food and craft products?	4.2.1.2; 4.2.1.5; 4.2.1.5.1;4.2.1.5.4;
Q10: What efforts are undertaken to create and promote regional geotourism products of the geopark?	4.2.1.2; 4.2.1.5; 4.2.1.5.1;4.2.1.5.2;4.2.1.5.6.
Q11: What efforts are undertaken to promote links between the geopark and the local economy?	4.2.1.3.1;
Q12: Does your geopark create second job or seasonal jobs for local communities?	4.2.1.3.1;
Q13: What are the conservation activities in the geopark?	4.2.1.4. 1; 4.2.1.5.2;
Q14: How many people are involved in conservation activities?	4.2.1.4. 2;
Q15: Does conservation of the geopark improve the local economy?	4.2.1.3.1; 4.2.1.4.1; 4.2.1.4. 2;
Q16: Does the geopark have close collaboration with the tourism sector?	4.2.1.3.2;
Q17: Are visitors beneficial to local businesses in your geopark?	4.2.1.3.2;
Q18: Do you count visitors?	4.2.1.3.2;
Q19: Does your geopark engage locals as guides, park guards, or others?	4.2.1.3.2;
Q20: Are local people stakeholders in the tourism sector?	4.2.1.3.2;
Q21: Does the geopark have workshop facilities?	4.2.1.4. 3;
Q22: Are the workshops managed by locals?	4.2.1.3.1;4.2.1.4.3;
Q23: Do the workshops improve the local economy?	4.2.1.4. 3;
Q1: in the second questionnaire: With which geoparks does your geopark collaborate? And in which area?	4.2.1.5.3.1; 4.2.1.5.3.2;

The data (close questions in questionnaires) were analysed using a statistical survey through SPSS tools. In addition, in order to increase the validity of the research, the data analysis was also carried out by means of the NVivo software. The qualitative software NVivo is a useful tool for performing qualitative researches. For this reason, NVivo was used in this study to analyse the open question (What are the conservation activities in the geopark?) of the international questionnaires. This open question introduces strategies for conservation of geoparks. Appling NVivo software is a method to identify the key concepts in conservation of geological heritage.

Since network activity is an innovation management in geoparks, in the next step, another questionnaire (Appendix 2) was designed to investigate the network analysis in geoparks. Regarding this, the questionnaire was mailed to all geoparks around the world in 2010; data collection was conducted from October to December. This questionnaire has two major purposes: 1) to determine the collaboration areas in the GGN and EGN as two social scientific networks, and 2) to measure the degree of collaboration and cooperation among geoparks as geotourism destinations.

The number of geoparks registered in GGN was 66 until October 2010. According to the 9th European Geoparks Network conference in Lesvos Island (Greece) the number of geoparks increased to 77 in 24 countries.

Since data for this part of study was collected over three months (from October to December 2010), it is obvious that the former geoparks had no collaboration with the 11 new geoparks for these 3 months. Thus we exclude the new geoparks (n=11) from the population (N=77), including, however, an aspiring geopark located in China (Hong Kong). This exception is justified due to the existing collaboration between this geopark and Itoigawa Geopark in Japan, and Yandangshan Geopark in China. Therefore, we end up with 67 geoparks (Figure 3). Nineteen questionnaire responses were received (28%). The majority of responses were collected in Europe (68%), and the others were from China, Australia, Iran, Malaysia, and Japan (Table 3.6).

Table 3.6 - Geoparks that replied to the second questionnaire regarding network activity (2010)

NO	Country	Geopark
1	Australia	Kanawinka Geopark
2	China	Leiqiong Geopark
3	China	Yandangshan Geopark
4	Croatia	PapukGeopark
5	France	RéserveGéologique de Haute-Provence
6	Germany	Vulkaneifel Geopark
7	Germany	Swabian Alb Geopark
8	Greece	Psiloritis Natural Park
9	Iran	Qeshm Geopark
10	Japan	Itoigawa Geopark
11	Malaysia	Langkawi Geopark
12	Norway	Magma Geopark
13	Norway	Gea Norvegica Geopark
14	North Ireland	Marble Arch Caves Global Geopark
15	Portugal	Naturtejo Geopark
16	Portugal	Arouca Geopark
17	Romania	Hateg Country Dinosaurs Geopark
18	Scotland, UK	Geopark Shetland
19	Spain	Sobrarbe Geopark

In this part, a social network analysis technique also was used to examine the relationship between members of GGN. Analysis of the coded data file was made using the network relationship program (Pajek). According to Hu and Racherla (2008), actors or nodes can be persons, organizations, or groups, or any other set of related entities. In this research, those geoparks registered in GGN are nodes, and relations between actors are depicted as links between the corresponding nodes.

Regarding analysis of data in Pajek for numbers of N geoparks, a coded matrix (N× N) was created in Microsoft Excel, in which the value of 1 indicates collaboration and the value of 0 points to no relationship, and the coded matrix was then imported to a text document and the file was imported to Pajek software. Finally, the Pajek program produced a picture of the social relationship network between the interviewed geoparks. Pajek software was used to visualise the network, and the collaboration situation of each geopark was derived from the numbers of links.

In addition, the usage of quantitative network parameters is applied to measure the degree of collaboration and cooperation among geoparks as geotourism destinations.

Besides the coded matrix, another matrix was designed to illustrate the fields of collaboration between geoparks. In this matrix symbols are used to indicate the collaboration areas.

3.5.2. Selection of the Local Data

As mentioned in the literature review, some authors (Smith, 1989a; Smith, 1989b; McKean, 1989; Mansperger, 1995; Brunt and Courtney, 1999; Duxbury *et al.*, 2007; Eraqi, 2007) demonstrated that tourism has consequences for residents, sometimes good and sometimes bad.

Nowadays geoparks as a new model of sustainable development and protection of nature strive to minimize the negative impacts of tourism. Moreover, according to several authors (Xun and Milly,2002; Xun and Ting, 2003; Zouros, 2004; Nowlan *et al.*, 2004; Turner, 2006; Rodriguse and Carvalho, 2009; Eckhardt, 2009; McKeever *et al*., 2010) geotourism as a new economic growth point and new branch of sustainable tourism can improve the expense of geo-heritage preservation, increase local revenues and enhance employment in geopark territories.

Interviews at the local level allow us to reveal the significant and tangible effects of the establishment of a geopark for the local development. Regarding this, Qeshm Geopark was selected as a case study, and the local communities living in the surrounding villages of geopark were interviewed. Respondents as host communities indicated their preference for tourism expansion and pointed out the role of creation of Qeshm Geopark on the minimization of negative sociocultural and socio-environmental impacts of tourism in their territory. In addition, they draw attention to the role of establishment of Qeshm Geopark for development of the local economy.

The aim of this part of the study is to identify policies and new strategies (innovation) pursued by the local government of Qeshm Geopark in achieving the goals of local development. For this purpose, questionnaires with random samples were administered in this step. Interviews in face-to-face format at the local level were conducted from July to

August 2009, and different ways of data gathering were used; regarding this, we travelled to villages located near the geopark, geosites, handicrafts workrooms, rental houses, and museums; we also distributed 29% of questionnaires in the summer festival annually held in Qeshm.

Residents of Qeshm Geopark were interviewed regarding (the affect or the role of) tourism on their community and geopark. According to the Statistical Centre of Iran (2006) the total population of the Qeshm Geopark area is about 17355 people who live in 19 villages. In this study locals more than 20 years old were interviewed and finally 720 (8%) questionnaires were collected (Table 3.7).

Table 3.7-The population of residents who replied to the questionnaires

Village	Population	20<	percentage of respondents
Salakh	2281	1163	8.2
Darkooh	550	280	2.4
Kani	311	159	1.4
Guri	726	370	2.6
Moradi	283	144	1.4
Tomgas	162	83	7
Dulab	1125	574	6.0
Konar Siah	324	165	1.5
Sar Rig	1498	764	7.9
Chahu Gharbi	527	269	2.4
Chahu Sharghi	919	469	5.6
Gambran	436	222	2.4
Tabl	3082	1572	18.1
Maleki	193	98	1.0
Doorbani	616	314	2.8
Guran	1131	577	6.5
Shibderaz	461	235	8.2
Berkekhalaf	314	160	7.6
Giahdan	2416	1232	13.5
Total	17355	8850	100

In the designed questionnaires (Figure 3.8 and Appendix 3) questions 1 to 3 evaluate economic problems such as unemployment which the local communities face, questions 4 and 5 ask the local communities to express their opinion on the development of tourism and geotourism –as a branch of sustainable tourism– in their territory. Furthermore, questions 6 and 7 aim at evaluating the negative social and environmental impacts of tourism on the local communities of Qeshm Geopark. Question 8 inquires into the role played by local government in the preservation of natural heritage. Besides this, questions 9 and 10 seek to ascertain public awareness of the local communities about geoparks and their activities.

Question 11 to 13 include an evolution of environmental, sociocultural and socioeconomic impacts of geopark establishment on local communities. Question 13 and 14 were designed to give a more detailed description of socioeconomic impacts. For instance these questions reveal the job opportunities and the rural income generation from local involvement in Qeshm Geopark activities.

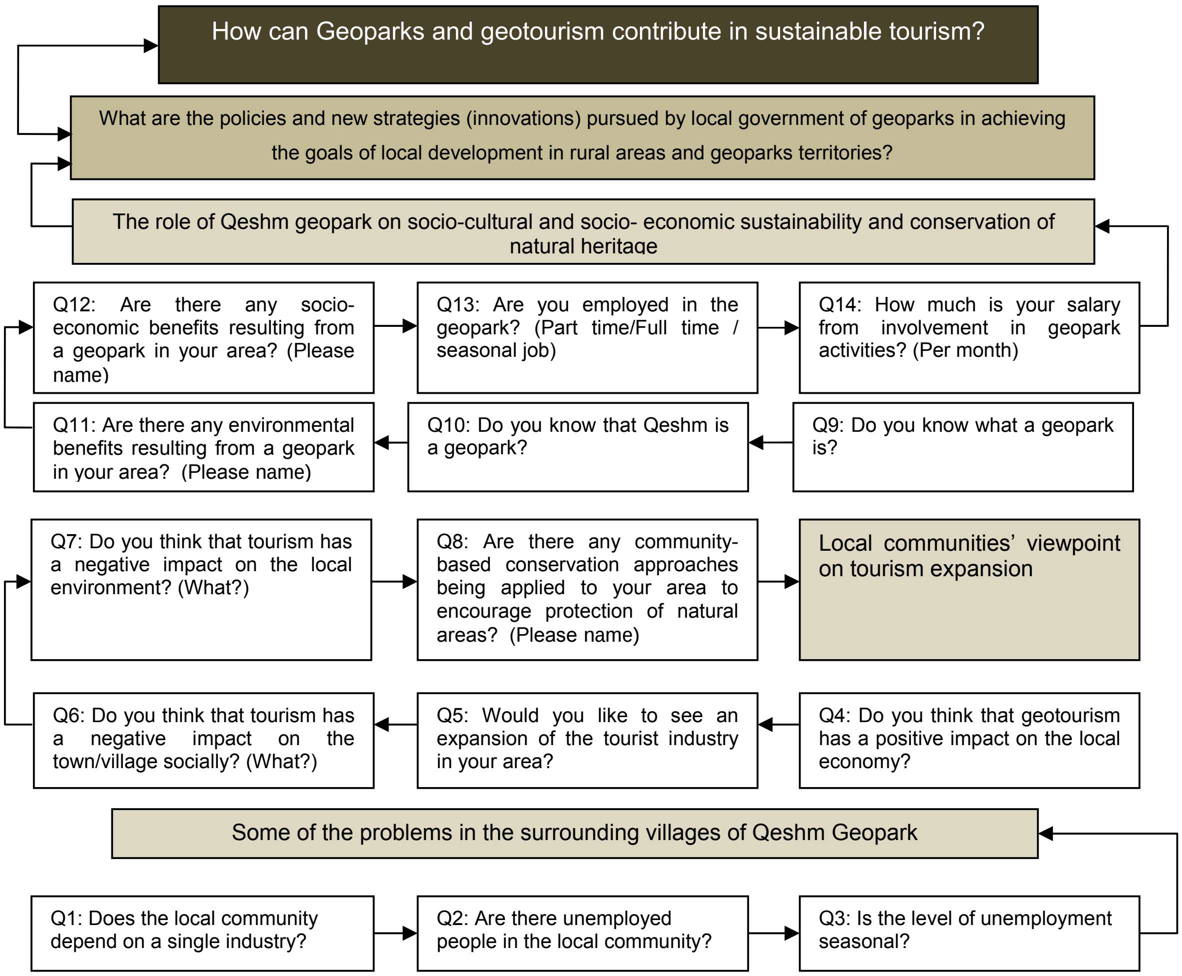


Figure 3.8- Connection between questionnaire questions and establishment of Qeshm Geopark, at local level (Source: own construction)

The data (closed questions in questionnaires) was analysed using a statistical survey through SPSS tools. In this phase, descriptive statistics are used to describe the basic features of the collection of data quantitatively. They provide simple summaries about the samples. Additionally, two sub–hypotheses were designed to investigate the role played by geoparks in employment of the local communities in rural areas, and the third sub–hypothesis examines whether the opinion of the local men about the negative social impacts of tourism is the same as the local women of Qeshm Geopark or not (Table 3.8)?

Table 3.8 -Sub-hypotheses (Source: own construction)

Sub- Hypotheses
H7: Geoparks contribute to employment of local communities in rural areas and geopark territories H_{Null}= Salary of local communities who are involved in geopark activities is equivalent to National Minimum Wage (NMW) rate (per month): M1=207 euro First sub-hypothesis for H7: Salary of local communities who are involved in geopark activities is not equivalent to National Minimum Wage (NMW) rate (per month): M1≠207 euro
H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories H_{Null}= Men and women earn equal revenue from geopark activities: $M_{Men} = M_{Women}$ Second sub-hypothesis for H7: Men earn more revenue from geopark activities: $M_{Men} \neq M_{Women}$
H8: Geoparks contribute to minimizing the negative socio- cultural impacts of tourism perceived by the local communities First sub-hypothesis for H8: The men more than the women, who live in the surrounding villages of Qeshm Geopark, think that tourism has a negative social impact on their community

It is worth mentioning that, for the purpose of testing sub-hypotheses different statistical tests were used. For example, a one-sample t-test was used to test the first sub-hypothesis. A one-sample t-test is a statistical procedure that is applied to know the mean difference between the sample and the known mean value of the population.

In this sub-hypothesis we want to calculate the mean difference between the monthly salary of the local communities who are involved in Qeshm Geopark activities and the National Minimum Wage rate per month in Iran.

The second sub-hypothesis was tested by an independent samples t-test procedure. The independent samples (or two-sample) t-test is used to compare the means of two independent groups. In the above mentioned sub-hypothesis the mean revenue of local men–from engagement in geopark activities in the form of part time, second or seasonal jobs –was compared with the mean revenue of local women.

Pearson's Chi-square test, which is the best-known of several chi-square tests, was applied to test the third sub-hypothesis. This Chi-square test enables us to compare observed and expected frequencies objectively.

Irrespective of quantitative analysis, the SWOT analysis method is used to determine the potentials and weaknesses of the Qeshm Geopark.

The SWOT analysis method, with experiences gained from different geoparks, and the results of descriptive analysis, helped us to design three SWOT matrices for the natural (geo and bio) and cultural heritage of the Qeshm Geopark. These matrices recommend new strategies which reduce the negative impacts of tourism in the Qeshm territory. Figure 3.9 illustrates the systematic steps for phase three.

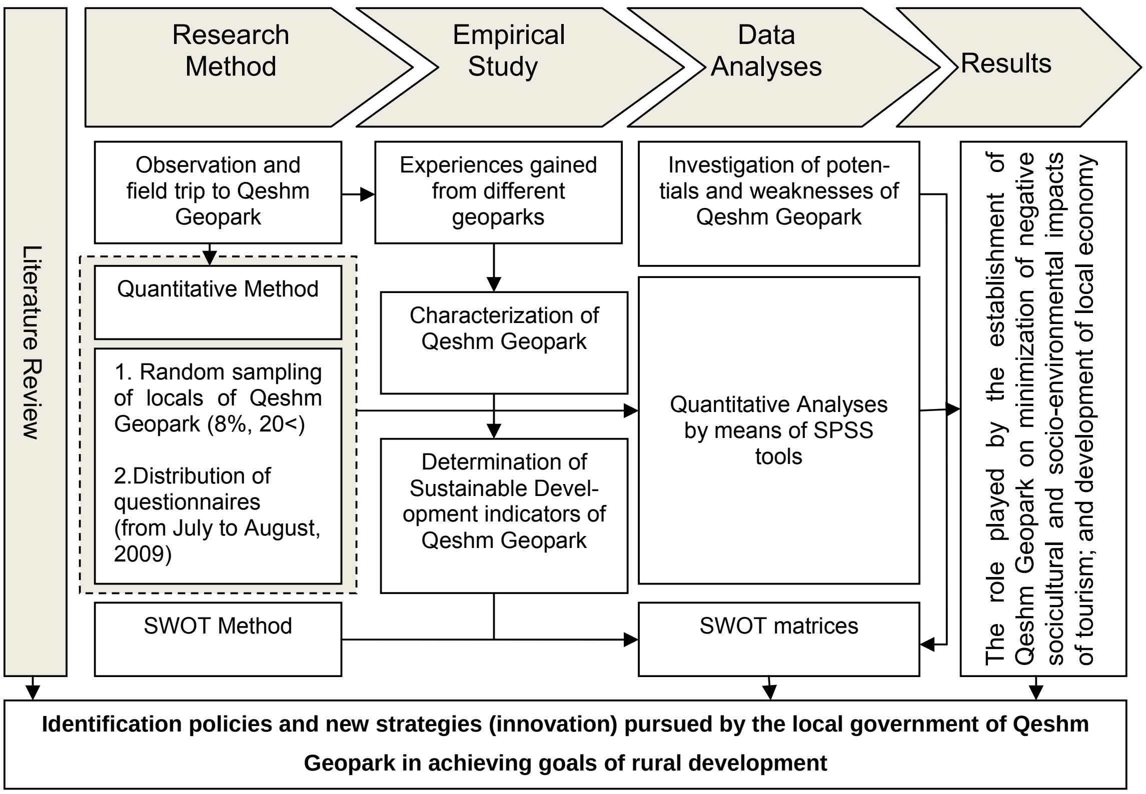


Figure 3.9 - Modelling of phase 3 of methodology

(Source: own constriction)

3.6. Summary and Conclusions

The topic of this thesis is interdisciplinary; therefore the academic readings drew primarily on concepts developed within the disciplines of sociology, human geography, tourism and natural sciences (geology and ecology). It is noteworthy that, quantitative research methods were originally developed in the natural sciences to study natural phenomena.

However examples of quantitative and qualitative methods are now well accepted in the social sciences and leisure and tourism research. Therefore, the combined method (quantitative and qualitative) was used in this thesis.

The major objective of this study is to investigate how geoparks and geotourism can contribute in sustainable tourism.

In order to highlight the role of geoparks in rural development and achieve the abovementioned objective, both primary and secondary research was used. In other words, the basic method is comparison of different geoparks registered in the UNESCO Global Geoparks Network, to ascertain policies and new strategies (innovation) pursued by the local governments of geoparks in achieving the goals of sustainable tourism for rural development.

Regarding this, three questionnaires were designed: the first and second were filled in by authorities of geoparks and the third one was filled in by local communities of the case study (locals who live in the surrounding villages of the Qeshm Geopark).

According to the literature review the thesis topic is new and geoparks and geotourism are a new subject recently; so geopark activities have not been studied thoroughly yet. Hence sending electronic questionnaires to geoparks around the world can help us to collect more information about geopark activities and innovative strategies.

Moreover, interviews with the local communities of Qeshm Geopark territory create an opportunity to investigate thoroughly the effect of the establishment of a geopark and development of geotourism on minimization of negative impacts of tourism in rural areas.

The local and international data was analysed using SPSS tools, NVivo, and Pajek software.

After discussing and justifying the methodological choices for this research, the next two chapters present the results of the empirical studies.

CHAPTER 4- Sustainable Tourism in UNESCO Global Geoparks Network

Part 1- Geographical Areas where the Empirical Study was conducted

4.1.1. Introduction

Chapter 4, part 1 explains how geoparks attain their targets. It begins with a glimpse into the characterisation of geoparks, where the empirical study is conducted. This part also covers the geographical characterizations, innovative strategies, and main activities of the geoparks that replied to questionnaires.

4.1. 2. Characterization of the Areas where the Empirical Study was conducted

As mentioned in chapter 3, two questionnaires were sent to all geoparks around the world. Firstly, twenty-five questionnaire forms were collected after having been filled in by the chosen respondents. The majority of responses were from Europe (80%) and the others from Australia, Iran, Malaysia, Japan, and Brazil. This questionnaire evaluated the role of geoparks in socioeconomic, socio-environmental and sociocultural sustainability. The empirical study was conducted from March 2009 to January 2010.

The second questionnaire, which investigated the area of collaboration between geoparks, was conducted from October to November 2010. In this phase nineteen geoparks replied to the second questionnaire. Once again the majority of responses were from Europe (13 geoparks from 10 countries – France, Portugal, Germany, Greece, Spain, Norway, North Ireland, UK, Romania, and Croatia – and the others from Australia, Iran, Malaysia, China, and Japan.

This part takes a look at the geoparks where the empirical study was carried out. The information of this part was gathered from a literature review, and the questionnaire filled in by geopark authorities.

4.1. 2.1. Réserve Géologique de Haute-Provence (France)

Réserve Géologique de Haute-Provence (RGHP) geopark is located in the southeast of France and covers 2100 km^2 from *Montagne de Chine* to the Gorges of *Verdon* River. The main activities are centred on agriculture (sheep-raising, in particular, plays an important part in landscape conservation) and tourism. The tourism focuses on leisure, nature, and culture. Moreover, the mineral springs and spa play an important role in *Digne-les-Bains* tourist attractions. These two pillars (agriculture and tourism) also support services and crafts; but there is no industry in the territory.

Visitors can experience 300 million years of the earth's history in this geopark. Fossils, tectonic and sedimentary outcrops are geological heritage sites in this area (Unjah, 2008).

It is notable that France was a member of the 4 countries which announced the geopark term as an innovation to improve socioeconomic activities of locals, conservation of geo-heritage, and popularization of the geosciences. Regarding this, the geopark team believes that the approach to sustainable management can be directed into two paths: network and initiative. Hence, managers of the geopark try to develop them by establishing a good partnership with business entities, libraries, student facilities, farms, camping and caravanning sites, hotels, hostels, restaurants, bars, tourism offices, and nature tour guides. Nature guides are a group of professional local guides that have the ability to describe the rich geological heritage of the area in addition to other heritage.

Their vigorously conducted tours range from school children, families, group, associations, club, and enterprises to individuals who are interested in the geological heritage. In order to maintain the standard of scientific information and quality of guides, all guides are encouraged to take the course with the Réserve. Recently, 23 active nature guides have joined the Réserve Network. The guides and their partners, through an awareness program, have attracted much more tourist attention to this area.

Several initiatives created by their partners, such as creating geo-products (ammonite chocolate, ammonite bread, and pastries, are among the attractions in Digne les Bains). Geotourism guide is another innovative activity in this territory (Unjah, 2008).

At present, the RGHP geopark is supported by the Ministry of Environment and the local municipality.

4.1. 2.2. Naturtejo Geopark (Portugal)

Geopark Naturtejo was the first Portuguese geopark integrated into the European and Global Geopark Networks. It was registered in the Global Geopark Network (GGN) in 2006. Geopark Naturtejo is a vast territory, 4616 km^2, covering 6 municipalities (Castelo Branco, Idanha-a-Nova, Oleiros, Proença-a-Nova, Nisa and Vila Velha de Ródão) which, to a great degree, financially support it.

According to Carvalho and Rodrigues (2010a) the Naturtejo Geopark comprises more than 170 geosites identified in the Naturtejo Geopark Geosites Inventory; 1 Natural Monument (Portas de Ródão); 2 Thermal Springs (Monfortinho and Fadagosa de Nisa), 3 Natura 2000 Sites (Serra da Gardunha, Nisa/Laje de Prata and S. Mamede), internationally recognized important Bird Areas, 1 Natural Park (Tejo Internacional), 5 Schist Villages (Figueira, Álvaro, Martim Branco, Foz do Cobrão and Sarzedas), 2 Historical Villages (Monsanto and Idanha-a-Velha), several fortified villages (such as Penha Garcia, Salvaterra do Extremo, Segura, Montalvão, Rosmaninhal, Nisa or Amieira do Tejo), more than 30 local to national-importance protected monuments, and several geosites already classified as municipal interest.

The geomorphological, geological, paleontological and mining heritage sites are monuments with regional and international geological significance in this area. An example is the wonderful exposure of trilobite trace fossils in the Penha Garcia Ichnological Park. Visitors, going to the fossils trail, will directly look at past time windows opening on the sea bottom of 480 million years ago (Carvalho and Martin, 2007). Portas do Ródão and Vale Mourão gorges, the Roman gold mine of Conhal do Arneiro, and the granite morphologies from Serra da Gardunha and Monsanto are the other geological trails in this geopark. There are also granite outcrops such as the inselberg archipelago and demi-horst with outstanding landforms.

The geopark is a partnership of municipalities and the local entrepreneurs for developing innovative strategies for sustainable development. Geopark officials play a vital role in consulting with locals and suggesting innovative ideas to them with the goal of economy improvement in geopark territory. Naturtejo Geopark cooperates with private sectors such as natural spa health centres, foreign and domestic outdoor companies, NGOs (Non-Governmental Organization), hotels, restaurants, and family guest houses.

An educational program in schools and universities is the next initiative in the geopark. Naturtejo Geopark started an educational program in 2007 and at the end of 2009 succeeded in educating 3813 students and teachers (Catana and Rocha, 2009). In this program age ranges are from 4 to 10 years; this program embraces two educational activities including: “School Meets the Geopark” and “Geopark Goes to School”. The geopark employed local geologists as teachers, regarding the fact that no one knows the geopark territory better than locals.

Apart from educational programs, geopark officials attempt to improve socioeconomic activities of the local communities by geotourism and new job opportunities such as the establishment of a geo-bakery, geo-restaurant, geo-museum, and family guest house and organization of geo-sports and geotours.

Establishment of a geo-restaurant and geo-bakery in Naturtejo Geopark is not only inspired by the landscape but also revived the past civilizations and ancient traditions.

The geo-bakery[1] is managed by a geologist couple. Geology stimulates the couple's participation in management, for instance they make trilobite and granulite cookies in the geo-bakery, and serve them on tours and at conferences as geo-products. Moreover, they have close collaboration with authorities of Naturtejo Geopark and they use the brand of geopark for their geo-products. Besides this, the geo-bakery has designed a geo-menu and serves geo-food. Each pizza in this restaurant has a geographic name, for example Nazca Pizza (an example of a tectonic earth plate). Aside from tectonic pizza, the geo-bakery make Orogenic Toasts (Cadomian, Variscan and Alpine, representing the major mountain belt events from Naturtejo Geopark) (Geraldes and Ferreira, 2009) (Appendix 4).

Casa do Forno is not just a geo-bakery alone; it is a family guest house as well. It is noteworthy that every room has a geologic name and is decorated with geological landscape pictures. Additionally, in the corridors and yards the visitors can see the collection of stones and local handicrafts.

The establishment of a geo-restaurant[2] is another innovation of the geopark. *Petiscos e Granitos* restaurant is located in Monsanto village. The restaurant "*Petiscos e Granitos*" offers various traditional dishes from the region with a special architecture feature: granite. *Petiscos e Granitos* is the first geological restaurant with traditional architecture using big granite stones weighing thousands of tons as walls and ceiling. This single area celebrates the "kitchen of the Earth" with a geo-menu. This restaurant is a new concept in catering, and an educational strategy that promotes the geological Portuguese heritage. Serving Boulder soup or Marble cake in the *Petiscos e Granitos* geo-restaurant constitutes other good examples for making geoproducts. *Petiscos & Granitos* is the first geological restaurant which is located in the Naturtejo Geopark territory. The food is served among boulders of granite caves (the geological architecture of the restaurant) (Appendix 5) (Rodrigues, 2009).

Furthermore, *Carlos Santos*, a businessman from Idanha-a-Nova has inaugurated the second geo-restaurant in Naturtejo Geopark. The *Carlos Santos Sabores da Terra* (Earth Flavours) geo-restaurant serves traditional recipes combined with local products such as local mushrooms, cheese and olive oil. In addition, geo-food such as *Cantchais* Lamb (*Cantchais* is the local name for granite boulders) is served in this geo-restaurant. The

[1] Casa do Forno (http://www.casadoforno.com.pt/)

[2] Petiscos e Granito restaurant (http://www.georestaurante.net/a5.html)

menu of this geo-restaurant is related to local geological landscapes (Naturtejo Geopark Authorities, 2010a).

The last but not the least innovation in the geopark territory, is the establishment of a family guest house which improves the economy of the local communities, especially retired people who are alone. There are some family guest houses in Geopark Naturtejo territory. *S. Torcato-Moradal* guest house[3] is a famous one which used schist (The Stone in the area) in its walls and its logo refers to its architecture. This house is managed by a local old couple; they serve traditional food and manage tours for tourists. This family guest house opened in 2006 and it has 4 rooms. By the end of 2009 this guest house had served 500 tourists (Appendix 6).

4.1. 2.3. Arouca Geopark (Portugal)

Arouca Geopark was the second Portuguese geopark integrated into the European and Global Geopark Networks in 2009. The area of the geopark is around 328 km^2 and corresponds exactly to the administrative borders of the Arouca municipality with about 25000 inhabitants (Abreu SÁ, 2009).

There are 41 geosites in Arouca Geopark and the geopark is known for its outstanding geological heritage of international significance, with particular emphasis on the largest trilobite fossils (Abreu SÁ *et al.*, 2009).

Arouca is officially managed and financially supported by the municipality. Arouca Geopark cooperates with universities, hotels, museums, restaurants, bungalows, and rural hotels. In addition to geological heritage, there are natural, architectural, cultural, and historical heritage sites in the geopark. The cultural heritage of Arouca goes back to the prehistoric times. In this territory, there is mining heritage remaining from the Romans.

Geopark officials play a vital role in the educational program; at the end of 2009, they had succeeded in educating 3956 local pupils and 331 local teachers (Catana and Rocha, 2009). Likewise, the geopark runs an educational project called "*Geoteca*"; this project, was initially developed by the school libraries and the main goal of the project was to improve the knowledge of students and teachers about Arouca Geopark (Rocha *et al.*, 2009). In this regard, the geopark held an innovative workshop titled "Make your own

[3] S. Torcato-Moradal guest house (http://www.s-torcatomoradal.com/en.htm)

Trilobite"; this workshop reinforced the knowledge of the students about trilobite and geopark activities; the children painted the trilobites and dressed up as trilobites, and raft boats in Carnival 2009 (Appendix 7).

Furthermore, the Arouca Geopark was already well known for its nature sports activities such as rafting, cycling, climbing, and hiking.

The Centre for Geological Interpretation of Canelas[4] is an innovative local business in Arouca Geopark. This private fossil museum was built by the company *Ardósias Valério and Figueiredo, Lda* with financial support of the LEADER program. The fossil museum opened to the public on 1st July 2006, and it offers tours of the interior of rocks formed on the sea about 500 million years ago, watching the enigmatic creatures that inhabited it, which include some of the largest and rarest trilobites of the world (Appendix 8). It is noteworthy that the fossil museum was a factory in the past, but when the Arouca Geopark established, it became part of the geopark geo-trail, and now it has a close collaboration with geopark. The fossil museum generates income through selling tickets and holding educational programs for schools. By August 2009, more than 27000 visitors visited this site. Indeed, this centre is a private museum and educational centre.

The museum has cooperation with local artists; regarding this, they sell and exhibit local handicrafts in their museum. Decorative geo-products based on geological elements such as trilobite clocks, trilobite glasses, trilobite lamp covers, etc. are good examples of geo-products (Appendix 9).

The last but not the least innovation in Arouca Geopark is creation of geo-products. *Pedras Parideiras* (Appendix 10) is a geo-product in Arouca Geopark. *Pedras Parideiras* are cookies which have the shape of biotite nodules from local granites. Visitors can find these cookies in one of the famous cake shops of Arouca (*casa do pão de ló de Arouca*). *Pedras Parideiras* is a symbol of the *Castanheira Nodular* Granite, with a phenomenon popularly known as *Pedras Parideiras* (rocks that give birth).

4.1. 2.4. Vulkaneifel Geopark (Germany)

Vulkaneifel Geopark with 1250 km^2 area is located in the Eifel, *Rhenania-Palatinate* region. This geopark has a fascinating landscape which provides an insight into more than 350 million years of history including the youngest volcanic activity in Germany. Volcanoes

[4] The Centre for Geological Interpretation of Canelas (http://www.cigcarouca.com/)

are conspicuous; 350 eruption centres have been known up to now, from which this landscape received its dominant morphological shaping and the name Vulkaneifel (Schueller and Bauer, 2004).

This geopark was registered in the European Geoparks Network in 2000 and became a member of the Global Geoparks Networks in 2004. The local government and private administration manage the geopark and 7 municipalities and the business development agency of county Vulkaneifel financially support it. The geopark cooperates with some other organizations such as: Eifel tourism GmbH, Tourism agencies at municipalities, and regional forest administration.

Vulkaneifel Geopark became economically famous for its mineral water resources. Today, many volcanologists and geologists as well as environmental scientists and biologists do research here because of the large open pits which give a new dimension to looking into volcanological processes and in finding perspectives for sustainable developments ideas.

Vulcaneifel Geopark currently comprises a network of 12 geo-units. Four of them are museums like the *Vulcan-museum Daun*, *the Maar-museum Manderscheid,* the *Iron-museum Juenkerath*, and *the Natural-history Museum of Gerolstein*.

The park includes three existing geo-trails: *Geo-Pfad Hillesheim, Geo-Route Manderscheid, and Geopark Gerolstein*, each with marked geological outcrops and locations on routes around small towns with a large amount of geological information on interpretation panels. There is a pool of outdoor information which enables groups to do tours on their own (EGN, 2005).

In addition, the Eifel region is a natural area with a unique character, known as an attractive landscape and region of origin as high-quality products with the new regional brand “e” which can be recognized directly by consumers for the special quality of the Eifel.

Its symbol is the brand logo with a yellow “e”; this brand is a multipurpose brand and is used for agriculture, forestry, trade, tourism activities, and the local products. Moreover, geo-products such as Vulkaneifel mineral water cocktails are innovations for promoting regional and local products in this geopark.

4.1. 2.5. Geo and Naturepark TERRA.vita (Germany)

TERRA vita geopark is located in North-Western Germany in the transitional zone between the northern German lowlands and the north-western hill country, about 100 kilometres from the North Sea coast and some 35 km east of the Dutch border. With an area of 1220 km^2, the Nature Park is one of the cross-border Parks of the Federal Republic of Germany (GGN, 2008a).

This park with an area of 901km^2 is located in Lower Saxony, in the district of Osnabrueck. The rest of the territory, 319 km^2, is located in North-Rhine Westfalia in the districts of *Minden-Luebbecke, Herford, Guetersloh*, and the city of Bielefeld.

70% of the Natural Park is covered with forest; the other 30% is mostly used for agriculture activities (GGN, 2008a). TERRA vita was registered in EGN in 2001, and it is the government and private administration who manage the geopark, but 45 local municipalities financially support it. The geopark cooperates with organizations such as: the tourism sector, schools, environmental foundations, and diverse institutions of environmental education.

TERRA vita geopark is the documentation of the earth's history from the carboniferous age about 300 million years ago up to today, nearly without gaps, in a narrow area in this region. One example for an impressive opening in carboniferous rock is the quartzite-quarry of the "*Piesberg*" north of Osnabruck, housing an industrial-historical museum with an accessible black coal pit from the 19th century.

The dinosaur footprints of Barkhausen in the "*Wiehengebirge*" left by altogether eleven dinosaurs of two different species appear in the upper Jurassic age and are unique in Europe. The footprint quarry is the most important geo-site of the nature park (Appendix 11).

The Rocks of *Dorenthe,* which are an outcrop of lower cretaceous sandstone, are another geopark geosite; this geosite is a tourist attraction in the western part of the Nature-park. The "Sea of Rocks" on the "*Gattberg*", including the huge erratic block gives a sense of the enormous power of the glaciers that once moved through the Nature-park area.

TERRA vita geopark has an exhibition and facility of two hectares, where visitors are given a geological overall view by the Nature-park team and where educational programs for schools are offered. It is a popular excursion destination for scientists from all over Germany and the Netherlands. A current registration of geotopes completes the scientific list of existing geological objects. The main target of the geopark activities is further protection measures for geotopes together with enlarged public relation activities, allowing visitors and also inhabitants a better understanding of the connections of earth history in different ways. The 1999 extension and development of the Geosite "Dinosaur Footprints" into an open air museum, was an important step in this direction.

Touristic offers like thematic bicycle routes, action tours for groups, and thematic maps are being worked out by the Nature-park administration. In 2004, a set of 17 cycling-routes called "TERRA. Trails" was published and a printed guide map for each route provides public information for visitors.

4.1. 2. 6. Geopark Harz . Braunschweiger Land Ostfalen (Germany)

Harz Braunschweiger Land Ostfalen is located in Northern Germany and encloses the Harz Mountains and the northern situated "*Braunschweiger* Land" up to the *Flechtingen* Ridge. This geopark was registered in EGN in 2002. The whole geopark area is about 10000 km^2 and it contains 18 districts in three German federal states. Due to the very large area, the geopark is managed by a committee of two associations (George and Zellmer, 2002):

- The “Regional verb and Harz" in *Quedlinburg* is an organisation essentially formed by the rural districts of the Harz Mountains.
- The registered society called "*Femo*" (a part of “*Braunschweiger Land / Ostfalen*).

The geopark is under the supervision of government and private administration; it is financially supported by the local municipalities and environment department.

The Harz Mountains are composed of Palaeozoic sediments and magmatic rocks. They have been extensively documented over the past 1,000 years in historical accounts of mining and research in the area. And the Harz Mountains are characterized by a geographically small-scale occurrence of sedimentary rocks (sandstone, slate, chert, greywacke, and reef limestone) as well as igneous rocks (meta-basalts, keratophyre, and tuffites) (George and Zellmer, 2002).

‘The Classic Square Mile of Geology’ is the theme of geopark Harz. Sedimentary, volcanic and plutonic rocks as well as a complete sequence of Mesozoic sedimentary rocks, which are packed with fossils, can be viewed in this small area (Appendix 12). The above mentioned name was given to a small area near Goslar town which is visited by professors and students from Germany and all over Europe (George and Zellmer, 2009).

In this area visitors can experience geopark attractions either independently or under the guidance of trained personnel. For this purpose, information booklets and leaflets are available, for example the "Landmarks", which give an overview of the geology of the Harz region. In cooperation with museums and schools, special educational activities are continuously being developed.

In the geopark museum there are graphs to explain the geological events that led to the sensational formations at the northern edge of the Harz Mountains. Rocks as well as ores and minerals from all eras of the classical square mile are exhibited (EGN, 2009b).

4.1. 2.7. Swabian Alb Geopark (Germany)

The geopark Swabian Alb which is situated in southwest Germany was registered in EGN in 2001. The geological structure of this region was shaped by the uplifting of the mountains of the Black Forest. Consequently, the Mesozoic sediments to the east of these mountains dip towards the southeast and the Triassic and the Jurassic rocks from escarpments are directed to the northwest. Swabian Alb Geopark is sparsely populated and is still a rural area. The Alb is a karst topography area and for this reason has the highest density of caves in Germany, with many of caves open to the public. Important wells are also attractive karst features. Volcanic activities during the Tertiary left traces as Maars or cones of eroded vents and a thermal limestone travertine including plant and animal fossils exit in this area (Heizmann, 2009).

Due to its rich geological heritage the Swabian Alb is a traditional geotouristic destination with a high density of different attractions like 15 show caves, several museums, interpretive trails and sites to fossick, etc. Guided landscape adventure tours by trained rangers are offered in different parts of the Alb. Moreover, the hot waters, rich in minerals, which well up from the depths of the earth provide a source of health which can be enjoyed in the pleasant resorts; spas and mineral baths of the region are another tourist attraction in this region.

The geopark is organisationally incorporated into the Swabian Alb Tourist Board. It is a cooperation platform for different institutions such as ministries, universities, associations, and authorities, involved in geosciences, tourism, and nature conservation. The geopark is under the supervision of the government; the local municipalities and tourism sector financially support the geopark. Their aim is to develop the geopark as a strong contributor to the sustainable development of the Swabian Alb.

4.1. 2.8. Psiloritis Natural Park (Greece)

Psiioritis Natural Park is located on the Greek Island of Crete, in the southern Aegean Sea. It has an area of 1200 Km^2, with 157 settlements and towns and a population of about 42234 inhabitants.

It is the government and private administration who manage the geopark and 11 local municipalities financially support it. Moreover the geopark cooperates with other organizations such as Natural History Museum, university of Crete, AKOMM Psiloritis (Development Tourism Agency), local development S.A, Anogia Environmental Education Center, Ministry of Education and Psiloritis Land Network.

Aside from management structure, Psiloritis geopark is known because of its big faults with excellent and imposing fault surfaces, fossil sites (such as the Permian corals), caves, impressive gorges, and plateaus that host many native species of the island, and unique fold associations. Geomorphologic structures have sustained the culture, tradition and customs of the inhabitants for thousands of years. In the Psiloritis mountains mythology, folklore, tradition, and natural environment meet together (Fassoulas *et al.*, 2009).

Moreover, many herbs and endemic plant and animal species flourish in this territory. These include the aromatic (such as *Origanum dictamnus*) and rare plants and endangered animals (such as vultures: *Gypaetus barbatus* and wild cats: *Felis silvestris creticus*) (Fassoulas *et al.*, 2009).

Consequently, in this geopark, visitors have an extensive choice of activities ranging from geo-sports, like swimming, hiking, mountain biking, and rock climbing to getting acquainted with the breathtaking science of geology, to observe birds, animals and plants, and to savour the traditional Cretan cuisine. Geo-products such as decorative or utilitarian ornaments, commemorative goods from stone or wood, furniture, children's toys and clothes which are symbols of geopark other initiatives in this geopark (Skoula and Fassoulas, 2006).

4.1. 2.9. Sobrarbe Geopark (Spain)

Sobrarbe Geopark with a surface area of 2200 km^2 (Poch, 2009) was registered in GGN in 2006 and became a member of UNESCO Global Geopark Network. The geopark encompasses the entire Sobrarbe, and this area is located in the Alto Aragón region, Spain, and is bordered by France along the north. The management structure of the geopark is public administration and the geopark is financially supported by the local municipality. Moreover, the geopark cooperates with other organizations such as Association of Tourism Enterprises of Sobrarbe, Ordesa and Monte Perdido National Park, Natural Park Posets Maladeta, Natural Park Sierra y Cañones de Guara, Research Centre of Sobrarbe, Environmental Education organizations, the Tourism Department of the Regional Government of Aragon, the Environment Department of the Regional Government of Aragon, the Education Department of the Regional Government of Aragon, the University of Zaragoza, and University Autónoma de Barcelona.

Furthermore, old mining activities of metal ores are located in the high Palaeozoic Mountains in the northern part of the region, where glacial activities took place during the Quaternary (moraine deposits or glacial lakes). Further south, younger rock units from the Mesozoic to Paleocene age forms the mountains of the Ordesa and Monte Perdido National Park. As a result of the subterranean circulation of water, the region has one of the most visited karstic systems of Europe. The southern area comprises Tertiary sedimentary rocks from the Eocene to Oligocene age. A large variety of fossils, from Nummulite beaches to salt water crocodiles can be found in these rocks. In order to guarantee the conservation of this heritage, 50% of the surface area of Sobrarbe has been declared a protected area.

In addition, the geopark authorities, in order to promote geotourism and education, rebuilt an ancient castle and provided three new facilities, such as the Sobrarbe Geopark visitor centre “Space of the Sobrarbe Geopark”, the “Technical Office” and the “Geo-vision Room”. Furthermore, five bicycle routes, brochures, interpretative panels and guide-notebooks are other tourist facilities in this geopark (Poch, 2009).

4.1. 2.10. Parque Cultural del Maestrazgo (Spain)

The Maestrazgo Cultural Park with an area of 2700 km^2 is situated in the heart of the Iberian Mountains and was registered in UNESCO Global Geopark Network in 2004. The structure of the geopark is not private and 43 local municipalities and the Cultural department of regional government financially support the geopark. Moreover, the geopark cooperates with other organizations and companies such as the local council of *Comarca Cuencas Mineras*, Zaragoza University, Dinopolis, and Europe direct CAIRE.

As for geology, this is an area where Mesozoic materials are predominant, being the biggest part of the geological structure (Simon and Abril, 2009). The Maestrazgo geopark is a lovely natural area, as well as an exceptional laboratory for exploring the Mesozoic and Tertiary evolution of the Iberian Plate.

Tertiary materials are in several depressed areas, such as *Val de Jarque*, valleys of *Mas de las Matas* and *Alcorisa*, areas of *Crivillén*, and Upper *Guadalopillo;* at the same time, tertiary materials are present in Sierra de Borden.

Regarding lithology, strongly carbonated materials such as limestone dolomite rocks and marl appear in the higher and middle areas in Maestrazgo.

The strong folding undergone by Mesozoic levels in central Maestrazgo, as well as erosion by a river network, have produced steep areas, where canyons, crests, and hillocks are the main image: this produces large geomorphological diversity and outstanding landscape beauty.

Besides, calcareous rocks are favourable for endo-karstic processes; that is why caves and chasms are common in Maestrazgo.

The Mining Interpretation Centre is located in Aliaga. It has created a whole lifestyle that continues alive in people, landscape, and facilities. Additionally, fossil richness (such as dinosaur fossils and footprints) in Maestrazgo Cultural Park is seen in the paleontological park in the village of Galve (Appendix 13).

Irrespective of geological heritage, there are 13 historical villages labelled as "National Monument", castles coming from the Middle Age, and old country houses known as "*masadas*" in this territory.

The Park can be admired and understood by means of signposts, pathways, guides, museums, a complete scientific guidebook for academic people, a short guidebook for tourists, pedagogic tools for primary and secondary schools (including field notebooks and an interactive CD published in 2004 and widely circulated among teachers), and a comic for children.

4.1. 2.11. Copper Coast Geopark (Ireland)

The Copper Coast Global Geopark is located on the South East coast of Ireland, between Tramore and Dungarvan in County Waterford. The Copper Coast Geopark with 50 km^2 was registered in EGN in 2001. It is managed officially and the local municipality financially supports it. The geopark cooperates with other organizations and companies such as Geotourism Survey Instrument (GSI), Fáilte Ireland and Dunhill Ecoparks, Waterford County Council (WCC), University College Cork (UCC), and Copper Coast Tourism (CCT).

With regard to geology, the Copper Coast is an outdoor geology museum with geological heritage sites that reflect a variety of environments within which the area has evolved over the last 460 million years. Sedimentary and volcanic rocks illustrate the subsequent volcanism. Copper was mined extensively in the area during the 19th century. The geopark name is derived from this activity (Morris, 2009).

Beside the geological heritage sites, the geopark provided a range of educational services. Provision of signs (road & interpretation), a team of local guides trained by the geopark, walking cards and paths, a geological garden, picnic tables, art and craft workshops, the encouragement of growth of local businesses, an educational program (geology course), and fieldtrips for schools are instructional tools which were offered by the geopark to tourists and students (McCarthy and Sweeney, 2008).

4.1. 2.12. Marble Arch Caves Global Geopark (North Ireland)

The Marble Arch Caves Geopark is located in County Fermanagh in Northern Ireland; this geopark with 180 km^2 was registered in the European Geopark Network in 2001 and became the first European geopark in the United Kingdom. It is the government which manages the geopark and 2 County Councils, Fermanagh District Council and Cavan County financially support it. The geopark cooperates with other organizations and companies such as the Forest Service (Northern Ireland), the Northern Ireland Environment Agency, Colitte (Irish Forest Service), Fermanagh Lakeland Tourism, and Cavan Tourism.

Concerning geography, Marble Arch Caves are one of the most significant caves in Britain and Ireland (Appendix 14). These caves were first explored in 1895 and were developed as a tourist cave in 1985 and they are now world famous as one of Ireland’s leading tourist attractions.

The geopark offers a wide range of environmental education and field studies to schools, universities, and adult groups. Besides, trained tour guides of the caves, a cave tour book, hill walking, and motor-touring routes are the services which are offered to geopark tourists (Watson and McKeever, 2009).

4.1. 2.13. Lochaber Geopark (Scotland)

Lochaber Geopark, located in the highlands of Scotland, was registered in UNESCO Global Geopark Network in 2007. The geopark is under the supervision of private sector and the geopark cooperates with other organizations and companies such as Scottish Natural Heritage, The Highland Council, Heritage Lottery Fund, Highlands and Island Enterprise, LEADER, and outdoor companies.

Lochaber is famous for its spectacular scenery, which includes Britain’s highest mountain and the prominent landmark called *An Sgurr on Eigg* which is built of a rock called pitchstone: at 55 million years old it is the youngest volcanic rock preserved in Scotland.

Lochaber geopark is unique among its European counterparts because it has a geological record that includes not only the creation of a huge mountain chain by the collision of giant plates, but also the dramatic volcanic activity associated with the much later tectonic plate rifting when Greenland and Europe drifted apart (House *et al.,* 2009).

Lochaber is also a popular visitor destination. It has good travel links as well as a range of accommodation to suit every budget. There is also the opportunity to take part in numerous outdoor activities. This makes it an ideal location to discover more about the local landscape and enjoy a relaxing break.

4.1. 2.14. Geopark Shetland (Scotland - UK)

Shetland is a group of Islands lying 140 km north of the Scottish mainland. The Geopark Shetland includes a unique landscape and its rocks are hard and acidic (Swale, 2009).

The geopark is coordinated by the Geopark Shetland Working Group (GSWG). The lead partner is the Shetland Amenity Trust, which employs a full-time Geology Project Officer to coordinate the various geological activities and liaise with the European Geoparks Network.

The GSWG includes representatives from several partners including the Shetland Islands Council, Scottish Natural Heritage, Highlands and Islands Enterprise, Visit Shetland, the Shetland Tourism Association, the Association of Shetland Community Councils and various community groups.

It is noteworthy that the Shetland Geopark is member in thematic networks such as the volcanic thematic network and coastal thematic network.

Swale (2009) noted that visitors are attracted by the wildlife, particularly the birds, archaeology and historical connections and the unique landscape. A recent establishment in the geopark has provided a journey through billions of years of fascinating geological heritage sites. The geology of Shetland is recognised as a fundamental factor for understanding of the islands' natural and cultural heritage.

4.1. 2.15. Geological, Mining Park of Sardinia (Italy)

The Mining geopark covers an area of 3500 km^2 and for the rich deposits of lead, zinc, copper, tin, silver, and iron it has been acknowledged as one of the most important metal districts of Western Europe. Today all that remains of those areas is a rich heritage of mining archaeology as part of the Sardinian culture and past life (Manca and Pireddu, 2003). In 2007, the Sardinia geopark became a member of the European and Global Geoparks Network. The geopark is financially supported by the Administration and Environment department. Sardinia cooperates with other organizations such as universities.

In addition, the present economy of the geopark reflects the economy of Sardinia which is characterized by a weak structure; the sectors of tourism represent a strategy for rehabilitating this economy through geotourism. Tourists can visit a historic and environmental geo-mineral museum, where they can trace 8000 years of mining history (Agus and Atzei, 2009). And a lot enterprise is being done to offer its visitors a new and interesting aspect of this wonderful island.

Porto Flavia, Henry gallery and other numerous tunnels that today have been transformed into a museum are unique and particular examples of mining engineering in the past; and they have revived the Italian Centre of Coal Culture and Saint Barbara's Cave.

The Coal Museum is located in the Great Coal Mine of Serbariu in Carbonia, in the South West of Sardinia. The mining site operated from 1937 to 1964 as the most important Italian energy resource.

In early 2000 it was restored with educational and touristic purposes, leading to the inauguration of the Coal Museum in November 2006. The Museum tells the story of the mining site and of the miners who worked hard there (in the lamp room, the winding engine room, the mine shaft, and the underground gallery) (EGN, 2009c).

Furthermore, the geopark is characterized by an extended stretch of coast and variety of interesting landscapes and environment.

4.1. 2.16. Parco Naturale Adamello Brenta (Italy)

The Adamello Brenta Natural Park with 1146.5 km^2 is located in the west side of the Trento Province in north-eastern Italy. In 2008 it was recognized as an international “geopark” inside the European Geoparks Network and the UNESCO Global Geopark Network. The geopark is managed officially and Autonomous Province of Trient financially supports it. The geopark includes 39 municipalities and has a close cooperation with the local tourism sectors, schools, and a group of locals who involved in tourism accommodation activities.

In the west, the protected area encompasses *Adamello- Presanella Massif,* with its 55 lakes and several glaciers; among them; the *Mandron* glacier is the widest glacier in the Alps. The eastern area of the park contains the Brenta Group, the western most extension of the Dolomites (Ferrari, 2009).

Beside geological heritage, Adamello Brenta Geopark has diverse ecological heritage, for instance the bear and endemic flora. As the bears are endangered species, the geopark authorities believe that future of the bears is in fact strongly linked to the development of coexistence culture between people and the bears.

Among geoparks, Parco Naturale Adamello Brenta (Italy) is the first geopark in Europe which obtained ISO 14001 certification; the park can also boast EMAS registration (Moranduzzo, 2008).

Concerning geopark activities, geopark officials try to promote the local economy through the geopark brand. The Adamello Brenta European Geopark launched a project titled as “Qualità Parco”. This project uses the logo as a local environmental/marketing certification for hotels and local products. Moreover, the brand is used for agro-alimentary products as well (Ilaria, 2011). By the end of 2009, the geopark brand was used for the "Qualità Parco" hotels and 35 hotels have been certified out of a total of 335 hotels which are located in protected area. Moreover, the local tourism boards and other companies are allowed to use the geopark brand for their brochures and leaflets when they carry out projects in cooperation or partnership with the park.

Furthermore, the geopark becomes an ideal place for educational activities; it is also a well-suited place to spend a relaxing and healthy holiday and to practise outdoor sport activities.

The geopark also offers sports based on earth topography such as skiing, rock climbing, and geo-biking (Appendix 15).

An online shop on the geopark website is another tourist facility; the online shop offers geopark T-shirts, geopark posters, hats, umbrellas, rucksacks, soft toys, canvas bags, gadgets, geopark DVDs and geopark publications to tourists.

It is worth mentioning that Museum della Malga, ancient shepherd’s huts, and other buildings that maintain the characteristics of the traditional architecture are testimony to the Alpine culture in this geopark.

4.1. 2.17. Nature Park Eisenwurzen (Austria)

The Nature Park Eisenwurzen is located in the Austrian province of Styria. It is under the supervision of government and private sector and 7 municipalities and environment department financially support it. Moreover, Eisenwurzen geopark cooperates with other organizations and companies such as 12 Nature Park Partners, 13 Nature Park Speciality Partners, 7 Nature Parks of Styria, 17 GeoLine Partners, the Museum of Natural History, Vienna, Landes museum Joanneum, Graz, Wasserleitungsmuseum Wildalpen; Geology exhibition of the National Park Gesäuse, Collections of the monastery Stift Admont, Geological Survey of Austria, Universities of Vienna and Graz, Mining University of Leoben, Academy of Tourism, Krems; Tourism Agency Alpine Region National Park Gesäuse, Tourism Agency of Styria, the local tourism offices of the communities, and is in partnership with the tourism agencies of each of the 7 Styrian Nature Parks.

Geologically, Eisenwurzen is a part of the Northern Calcareous Alps. Its rocks, consisting primarily of limestone and dolomite, were deposited over a time interval of 250 million years, from the Late Permian to the present (Kollmann and Mitterbäck, 2009). They were faulted, folded, and uplifted during Alpine Orogeny. Glaciers of the Great Ice Age and rivers provided the unique landscape out of the rocks. Important geosites include the type section of the Anisian stage of the Triassic and the Cretaceous / Palaeogene rocks of the Gams area.

Furthermore, geotouristic activities are the domain of *GeoLine*, the geological branch of the Nature Park. These comprise two permanent exhibitions: the museum of the Second Vienna Water Supply Line, which benefits from karstic springs in the area, and the Geo-centre of Gams, which provides an overview of the regional geology. Geo-trails and geo-biking provide in-situ evidence of geological phenomena: rocks, fossils as well as formations reflecting the incredible forces at work during the building of the Alps.

The most powerful of all geological agents may be explored in the Water Park of St. Gallen and with geo-rafting, which combines science with adventure (Appendix 16). Geo-rafting for kids combines sports and the fun of water with explanation of the geological features along the river by especially trained raft-guides (Appendix 17).

A landscape water model in the Water Park of *St. Gallen* is a place (11 × 9 m) which represents the geological approach to water activities. A thunderstorm is triggered by pushing a button. The rising of a water table in the mountains can be observed through peep-holes and a spring begins to release water from the hill-sides. Streams merge into rivers which finally open out into the sea (Kollmann *et al.*, 2009). Tourists and kids feel like *Gulliver* in *Lilliput* when they visit this landscape model of water erosion in *Gallen* Park (Kollmann and Weiskopf, 2009). This model is an educational instrument where kids experience water erosion.

Besides, the festival of geology which presents the volcanic eruption in the geopark is another educational activity.

In addition, a geo-workshop serves all activities related to the preparation of geological items. Fossils found during guided field trips are prepared under supervision and then investigated under the microscope. Even ordinary pebbles from the close-by stream provide unique souvenirs when they are cut and polished.

The last but not the least innovative activity is an annual exhibition in the geopark, which presents an exhibition of silicified wood from the Petrified Forest of Lesvos and the Bohemian Paradise, both members of the European Geoparks Network. Silica dyed by iron, copper, or manganese has replaced the wood in silicified tree-trunks. Even after millions of years, the characteristic wood structures of conifers, deciduous trees, or ferns can be recognized. This is demonstrated by slices of modern wood provided by the Austrian Forestry Museum of Großreifling.

It is noteworthy that the Eisenwurzen geopark strives to involve the local communities and volunteers in conservation activities of geopark and create seasonal jobs for them. Accordingly, this geopark improves the local economy as well as education in this territory.

4.1. 2.18. Hateg Country Dinosaurs Geopark (Romania)

The Hateg Country Dinosaurs Geopark with 1000 km^2 in area is located in the central part of Romania, in a very fertile region, surrounded by mountains in all directions. This geopark registered in GGN in 2005 and became a member of the UNESCO Global

Geopark Network. The management structure of geopark is official and the University of Bucharest financially supports it. Moreover, the Hateg Country Dinosaurs Geopark cooperates with other organizations and companies such as the local administration, universities, country administration, and ministry of the environment.

As for geology, the region is known world-wide for its "dwarf dinosaurs" from the end of the Cretaceous, 65 million years ago and this special paleontological heritage has inspired the name of the geopark.

Another geologic event that is well documented in the geopark is the volcanic rock-tuffs, lavas, and volcanic bombs marking the volcanic eruptions that took place in the region during the dinosaurs' existence.

Furthermore, the muddy volcanoes are a very rare phenomenon in continental Europe; these sites are one of the most visited and photographed landmarks in the Romanian geopark.
Besides, glacial lakes on the top of the mountains, at more than 2000m high, deep gorges, caves, alpine forests, meadows, orchards, and crops are the regional hosts of human history from the Paleolithic to Roman Antiquity and from the Middle-Ages to the Modern time.

It is notable that the Hateg Country Dinosaurs Geopark plays an active role in the economic development of its territory. Activities are financed through the projects and contribution of the local mayoralties.

Regarding this the geopark project aims to offer a general framework for development in this region in an attempt to revive the local traditions and to identity a coherent direction for economic development. According to this, there are two main axes to be followed:

- To promote activities and projects in order to help local initiatives, to assure the increase of local incomes, and to create structures able to attract investments.

- To revive and strengthen the local and cultural identity which is very strong and in danger of being lost through migration, poverty, external influences, and imports.

In addition, making geo-products in geopark such as dinosaur bread promotes education as well as the local economy.

The revitalization of the folkloric and handicraft traditions in this region that was mostly inhabited in the past by farmers and shepherds represents another task of the geopark. The “Hateg Country” is renowned for the specificity of the peasants' costumes, in only two colors - black and white, for the villagers' music and dances as well as handicrafts, especially woollen tissues and wooden sculptures.

The well preserved ruins, amphitheatre, and temples of the capital of the Roman province of Dacia, medieval fortresses, castles, churches, and monasteries, Dinosaurs valley trail, and butterfly discovery trails are geotourism sites of the geopark which were announced by UNESCO.

It is worth mentioning that hiking, mountain biking, rock climbing, and bird watching are offered to visitors by the geopark (Andrăşanu and Grigorescu, 2008).

The last but not the least geopark activities are geo-educational programs for secondary schools and universities of Romania (Andrăşanu, 2009).

4.1. 2.19. Bohemian Paradise (Czech Republic)

The Bohemian Paradise with 700 km^2 in area is situated nearly one hundred kilometres to the northeast of Prague. The geopark, registered in GGN in 2005, became a member of the UNESCO Global Geopark Network. It is under the supervision of government and private administrations; the geopark is financially supported by the local municipality. Moreover, the Bohemian Paradise geopark cooperates with other organizations such as environment department and tourism sectors.

Apart from the management structure in the geopark, there are spectacular landscapes built on a foundation of diverse rock types. Volcanic landscapes (including cinder cones and columnar jointed lavas) and Rock Cities (such as caves and rock shelters) are geotourist attractions in this territory (Řídkošil *et al.*, 2009).

Geopark authorities offer tourist facilities including ponds, outdoor swimming-pools, tennis courts, golf, fitness centres, and skittles, saunas, solaria, squash and volleyball courts. Furthermore, the Bohemian Paradise region also offers suitable conditions for winter sports such as downhill skiing courses with ski lifts, cross-country tracks, and winter stadiums.

In addition, rafting, diving, boating, fishing, hiking, cycling, climbing, and bird watching are other recreation activities in this territory.

4.1. 2.20. Gea Norvegica Geopark (Norway)

Gea Norvegica Geopark became a member of the UNESCO Global Geopark Network (GGN) in 2006 and became Scandinavia's first global geopark. Gea Norvegica Geopark is located in the south-eastern part of Norway. The total land area of geopark is 3000 km^2. The geopark is managed officially and 8 local municipalities and 2 counties financially support the geopark. The geopark cooperates with other organisations and companies such as tourism offices, the local food producers, schools, accommodations, and museums.

As regards geology, the geopark is located where the old Scandinavian geology meets the younger geology of continental Europe. Furthermore, the geopark is an international reference area for Carbonatites (limestone volcanism) (Dalhgren, 2009).

The oldest rocks of Gea Norvegica geopark formed more than 15000 million years ago. They were metamorphosed and deformed within the deep crust during the Sveconorwegian Orogeny about 1 billion years ago. In this territory there are a large variety of rocks which are famous for their minerals.

Besides this, two spectacular geopark localities (Mølen and Jomfruland) are situated along the largest deposits which formed 10,000 years ago.

Geopark authorities try to achieve three targets of the geopark (education, geotourism, and conservation); in this regard, they have designed a site for students and teachers of secondary schools (Appendix 18), also, Gea Norvegica Geopark has developed some fundamental educational packages to be used in primary and secondary schools. Consequently, in March 2007 with the geopark's collaboration, geology was defined in the curriculum of secondary schools (Geo1 and Geo2) (Annual Report, 2007).

It is noteworthy that the geopark strives to train guides; the geopark guides are important ambassadors for natural geological heritage and the local environment of the area. They are qualified and experienced communicators with a good knowledge about the geopark localities. With the local geology as the starting point, they show the interrelationships between the geology and the surrounding nature, historical and social development.

The geopark guides must complete a training program in order to get their certification as "Certified Geopark Guides". Likewise, geopark officials offer tourist facilities such as interpretive panels which are compatible with the landscape.

4.1. 2.21. Magma Geopark (Norway)

Magma Geopark is situated in southwest Norway and extends over 2329 km^2. Magma Geopark is under the supervision of five municipalities (Bjerkreim, Eigersund, Lund, Sokndal and Flekkefjord) which are located in the counties Rogaland and Vest-Agder.

The landscapes of Magma geopark are unique. The landscape was strongly influenced by the Ice Age and many glacial features are well preserved.

Mining history can be studied at several locations, including Blåfjell (titanium), Gursli (molybdenum) and Ørsdalen (tungsten and molybdenum) (Richard Wilson *et al.*, 2008).

Geology has played an important role in the cultural and industrial development of the region. Local mining activity started during the Iron Age when bog-iron deposits were exploited. Modern mining started in the mid-18th century.

Fishing, sightseeing, day cruises, spas, skiing, cycling, boating and hiking are sports and adventure activities which the geopark offers to visitors.

Designing a geopark calendar on the geopark website is an innovative strategy for advertising regional festivals of Magma Geopark. Establishment of museums and galleries (e.g. an art gallery for paintings, ceramics, glass art, wooden art and so on) are another activity of the geopark (Magma Geopark website, 2010).

4.1. 2.22. Papuk Geopark (Croatia)

The Papuk Geopark is situated in the eastern part of Croatia, in the Slavonia region. The lowland area of Slavonia is mostly flat agricultural landscape and Papuk as a part of Slavonian Mountains is a fairly distinctive feature in such a landscape. Papuk Geopark covers an area with altitudes ranging from 200 to 953 meters and comprises the area of the whole Papuk Nature Park (336 km^2) that was protected by Croatian government in 1999 (Radoniç and Paviç, 2007). Papuk was registered in the UNESCO Global Geopark Network in 2007; the geopark is under the supervision of government and the ministry of culture and tourism department financially support it. The geopark also earns some money from organizing walking tours, selling tickets or souvenirs. The Papuk Geopark is a famous geopark in making souvenirs related to geopark elements such as Bat badges, Papuk Nature Park T-shirts, Papuk Nature Park logo badges, and so on (Appendix 19). Moreover, the geopark cooperates with all national parks and nature parks of Croatia.

Forest vegetation covers more than 96% of Papuk Nature Park and bats are famous forest inhabitants; they also live underground in Papuk.

Beside the ecological diversity, there is geological and cultural heritage in this territory. Papuk is made of rocks whose ages presumably vary about 400 million years, from the Paleozoic through Cenozoic sediments reaching the youngest geological features as tuff barriers on Papuk waterfalls, whose creation process is present even today (Radoniç and Paviç, 2007).

One of the results of complex geological relations in Papuk is the hydro-geological phenomenon of warm springs in several stream valleys.

Furthermore, there are significant remains of cultural heritage in the Papuk Geopark associated with the pre-historic period and the middle ages (Radoniç and Paviç, 2009).

Geopark officials provide some tourist facilities including an educational centre, multimedia hall and visitor centre which are placed in Velika. In addition, numerous hiking trails enable visitors to stroll around the geopark. For sport enthusiasts there are free-climbing sites and paragliding lifts off-site. There are 104 kilometres of marked bicycle trails in Papuk and three educational paths with educational panels introduce the natural and cultural heritage of area to visitors. The public institution is offering interpretative guides through the natural and cultural heritage of the Nature Park for organized groups of visitors, and for schoolchildren, authorities have prepared several educational programs in nature.

4.1. 2.23. Kanawinka Geopark (Australia)

The Kanawinka Geopark with 26910 km^2 area is located in Southern Australia (Limestone Coast), Western District of Victoria, and has become recognised as Australia's first National Geopark and the first Australian UNESCO Global Geopark in 2008. The geopark is managed by the local government and private administrations; 7 local municipalities financially support it. The geopark has close collaboration with Park Victoria, tourism sectors, and the geological society.

One of the most important aspects of the geopark is the link between the geology and the people, their stories, culture, and history that builds a sustainable source of geotourism, brings jobs to rural and indigenous people and in turn helps to protect sites of importance and promote geo-heritage.

Kanawinka is the aboriginal meaning for "the land of tomorrow", but this area of Australia is considered as an important part of understanding the history of the earth's development (GGN, 2008b).

Geopark authorities also place emphasis on volunteers working in the area, not only to conserve the natural environment but also to provide services for tourists.

Besides this, interpretive signs, trail maps, workshops (such as basket weaving and volcanic), helicopter tours around the coast, and a visitor information centre are facilities which are offered to tourists.

Furthermore, the visitor information centre (The Lady Nelson) gives visitors both professional and recreational overview of the region, and this place helps in employment of local and other scientists, writers, photographers, and artists to produce dedicated geopark literature.

In addition, the visitors can enjoy seeing and hearing the erupting neon volcano in the geology room of the visitor centre and they can have a walking tour in the glass bottom cave (Appendix 20). Within the lava areas, there are four main precincts all with varying landscapes according to the period and type of eruption, including Australia’s youngest volcanoes, highly accessible volcanic cave systems, off-shore volcanic islands, remains of coastal volcanoes, and extensive systems of craters, lakes, and wetlands (The Lady Nelson Centre, 2009).

Victoria’s Western District is Australia’s most extensive volcanic province, recognised as being one of the most significant and the third largest in the world, encompassing more than 56 sites. The Blue Lake and the Crater Lakes area are important sites in the Kanawinka Geopark.

4.1. 2.24. Langkawi Geopark (Malaysia)

Langkawi Island, one of the well-known Malaysian tourism island destinations and the whole of its 99 islands covering a total area of 478 km^2, has been designated a Malaysian heritage and a global geopark by UNESCO in 2007.

The management structure of the geopark is officially and financially supported by the Federal Government. The Langkawi Geopark has a close collaboration with the Malaysian Hotel Association, Malaysia Travel and Tour Association, Langkawi Tour Guide Association, Mineral and Geoscience Department, Forestry Department, Wildlife

Department, Langkawil District Council, Education Department, Environmental Department, local universities, and Tourism Malaysia.

In 1987 Langkawi Island was declared a tax-free island as a strategy to draw more visitors not only to appreciate the exotic beauty of the island but also to shop and spend money. It is the only geopark in the world with the same duty-free status as Qeshm Geopark in Iran.

As regards geology, the island possesses a long geological history that dates back to the early Cambrian period. Among the main attractions of Langkawi Geopark are its oldest rock formation, high geological value, pristine beaches, and education-based tourism (Abdul Aziz, 2009).

Moreover, within the Langkawi Geopark there are three geo-forest parks: the Machinchang Cambarian Geoforest Park, Dayang Bunting Marble Geoforest Park, and Kilim Karst Geoforest Park (Appendix 21) .

Geopark authorities provide some tourist facilities and services such as sailing, snorkelling, mangrove tours, jet skiing, diving, kayaking, abseiling, climbing, jungle trekking, gliding and biking. Besides, Langkawi Geopark cable car tour, as an innovative strategy, gives visitors an excellent view of the island and surrounding islands.

Elephant riding which is available in Langkawi Island is another innovative geopark activity. Visitors can take short, 5-20-minutes rides on an elephant at the Oriental Village in Burau Bay. The last but not the least innovative strategies of geopark are spa therapies, traditional Malay body massage and traditional herbal and plant treatment.

4.1. 2.25. Itoigawa Geopark (Japan)

In 2007, 'Japan Geopark Network' was established by 13 regions. This network aims to promote high quality standards in park services, sharing of common strategies, and the exchange of knowledge. In 2009, Global Geopark Network approved 3 geoparks in Japan; geoparks registered in the UNESCO network were the Itoigawa geopark, the Toya Usu Volcano geopark, and the Unzen Volcanic geopark (Sasazawa, 2009).

The Itoigawa Geopark with 746.24 km^2 area is located on the Itoigawa-Shizuoka Tectonic Line; a fault zone that runs through central Japan. The geopark has many geological heritage sites, with rocks, minerals, and fossils ranging from the Paleozoic to Cenozoic Era, related to the processes of plate boundary areas.

In addition, people living near the local geoparks make efforts to raise local awareness of economic development and to encourage healthy living in the area. For example, they organize field excursions visiting the natural heritage sites. Furthermore, they invite schools from urban areas such as Tokyo to the local geopark and offer the experience of agriculture and fishing to students (Appendix 22). Itoigawa Geopark encourages their activities partly through the service by the Fossa Maguna Museum and partly through financial and logistic supports. The geopark is under the supervision of the local government and private sector, but the local municipality financially supports the geopark (Takenouchi *et al.,* 2008).

4.1. 2.26. Araripe Geopark (Brazil)

Araripe Geopark is located in the South of the State of Ceará, in the region of the sedimentary complex of Araripe. Araripe is the name of a rare bird found in this area.

The Geopark territory extends over approximately 3520.52 km^2 and covers 6 municipalities (Juazeiro do Norte, Crato, Barbalha, Missão Velha, Nova Olinda, and Santana do Cariri).

Araripe Geopark is an initiative of the State of Ceará represented by the Secretariat of Science and Technology and Higher Education, coordinated by the Regional University of Cariri-URCA. In December 2005, the Ceará State Government requested UNESCO's Division of Earth Sciences to acknowledge and accept Araripe Geopark as an effective member of the world network of geoparks under the auspices of UNESCO (Herzog *et al*., 2008).

Finally, in 2006 the Araripe became a member of the Global Geopark Network and the first geopark in the American continent (Slater, 2009).

The management structure of the geopark is official and the Ceará State Government financially supports the geopark.

Araripe Geopark is made up of nine sites of interest defined by their geological and paleontological relevance, which were named geotopes and are distributed throughout Cariri. They are the most representative sites of their geological strata and of their fossiliferous formations (Herzog *et al*., 2008).

The geopark territory belongs to a geologic fault bounded interior basin with sediment from the Devonian, Jurassic and mainly Lower Cretaceous periods with fossiliferous sediments which are set on a metamorphic and igneous crystalline basement. It is noteworthy that the first flowering plants and pollinating insects developed during the Lower Cretaceous time in the Araripe (Herzog *et al*., 2008).

The geopark authorities strive to develop educational programs for universities and schoolchildren (Appendix 23).

Moreover, they encourage locals to participate in conservation activities; in this regard, a group of students and volunteers are working on a conservation project titled "*Geopark nas escolas*".

Furthermore, during seasonal events, geopark officials involve locals in workshops and fairs to help create supplementary income for local communities. In addition, authorities try to introduce the geopark as a tool for developing adventure and nature tourism; therefore they have provided some tourism facilities such as sign posts, interpretative panels, artificial swimming pools and waterfalls for leisure-time activities, and hikes on trails in this area.

It is worth mentioning that there are some nature tourism potentials such as crocodile watching and scuba diving in Araripe Geopark (César Boggiani, 2009). Organizing a folk music festival (*festival de Repentistas de Araripe*) is another innovative activity in this area which is a strategy for cultural sustainability.

4.1. 2.27. Leiqiong Geopark (China)

Leiqiong Geopark with an area of 405.88 km^2 is located in the southern margin of the Chinese Mainland, straddling the Qiongzhou Strait. This geopark was registered in the UNESCO Global Geopark Network in 2006 (Huguangyan, 2008). Leiqiong Geopark consists of three parts: Haikou-Shishan Volcanic National Geopark, Hainan Province, Zhanjiang- Huguangyan National Geopark, Guangdong Province, and Beihai-Weizhou Island Volcano National Geopark, Guangxi.

Leiqiong Geopark is a geopark with the subject of Quaternary Volcanoes. There are more than 100 volcanic cones, lava tunnels, maar and maar lakes. It can be said that Leiqiong Geopark is a natural exhibition garden of Quaternary volcanoes.

The geopark has concentrated on maar clusters, and become the place where Maar Lake was first studied in China. Moreover, Leiqiong Geopark organizes the cooperative study of Chinese and German scientists (Kuiyuan *et al*., 2008).

Turtle rock is another geological heritage in this geopark. This site is unique among the volcanic geological heritage of Leiqiong Global Geopark and of much scientific research value. Geological scientists or researchers need to study the formation characteristics of the turtle rock to trace back the local geological environment during volcanic eruption.

4.1. 2.28. Yandangshan Geopark (China)

Yandangshan Geopark is located in Zhejiang Province in China, which covers an area of 294.6 km^2. This geopark was registered in the UNESCO Global Geoparks Network in 2005.

Yandangshan Geopark is a geopark with the subject of the geomorphology of Mesozoic rhyolite. The rock landform of the park is graceful, and the park in terms of geology is a large-scale Cretaceous caldera with abundant various rhyolites (GGN, 2008c).

Yandangshan Geopark established a sister relationship with Hong Kong National Geopark.

The landscapes of the geopark inspired many poets, painters and writers of China. An art geological painting show of Yandangshan Geopark organized by local painters is an innovation for introducing the geopark in this territory.

4.1. 2.29. Qeshm Geopark (Iran)

Qeshm Island is one of the Iranian communities in which traditional culture and lifestyle are interwoven, and this was a key component for UNESCO to establish the first Iranian geopark in this area. The Qeshm Geopark with an area of 32,000 ha is located in the Persian Gulf, Iran.

According to the Statistical Centre of Iran (2006), the total population of the Qeshm Geopark area is about 17,355 people who live in 19 villages. Pursuant to sustainable tourist attraction, the creation of Qeshm Geopark was important for geotourism development and the improvement of local socio-economic activities. Therefore, Darehshoori and Dakhteh launched the initial research activities of geopark, created in Qeshm Island. Accordingly, the primary geological report of Qeshm Geopark was written by Haghipour et al. in 2005 (Turner 2008). After that, the S. Turner UNESCO advisory group of geopark experts travelled to Qeshm Geopark and prepared a report for UNESCO

(Ziari, Rostam Gorani, & Beirand, 2008). Finally, Qeshm Geopark was registered in the GGN in 2006 and became the first geopark in the Middle East.

There are eight major sites in Qeshm geopark, including: Chah-Kuh valley, the valley of Stars, A'li Channel, Tandis ha valley, Shour valley, Namakdan caves and dome, Doulab and Koorkoora kuh. Furthermore, Kase salkh desert and the Roof of Qeshm are important geological monuments in this territory (Amrikazemi & Mehrpooya, 2005). Besides the geological heritage, there is ecological and archaeological heritage in Qeshm Geopark.

Since, the Qeshm Geopark selected as a case study at local level; chapter 5, part 1 will discuss the geographical area of the case study (Qeshm Geopark) in detail. In addition, by applying a comparison model and SWOT (Strengths, Weakness, Opportunities and Threats) analysis, new ideas for geotourism promotion and better management of the geopark will be suggested.

4.1. 3. Summary and Conclusions

All geoparks have the same targets (conservation of natural heritage, popularization of geological sciences through education and geotourism development, development of local economy through promoting geotourism and development of cultural sustainability). Network activities, collaboration with national parks and other organisations, innovative strategies, and the local involvements are key components in leading geoparks toward their targets.

Developing local marketing under the geopark brand is a strategy which Naturtejo Geopark, Vulkaneifel Geopark, Nature Park Eisenwurzen, Naturepark TERRA.vita European Geopark and Parco Naturale Adamello Brenta have applied to improve rural development in their territories.

It is noteworthy that all geoparks try to organize educational programs for schoolchildren and kids because they are not only the future generation of their territories but the communication bridge between schools and homes.

Combining fun and recreational activities with geo-knowledge is another new strategy in all geoparks appearing in geo-sports such as climbing, geo-biking, geo-kayaking, and so on.

Development of thematic geotourism can not only be a way for better management of geoparks and exchange of geo-knowledge but can also increase the knowledge of geotravellers, researchers, students, and locals who are interested in the specific branch of earth sciences. According to natural landscape and geological heritage, geoparks which were introduced in this study are classified in 6 categories:

- Group A (volcano tourist attractions) is famous for its volcanic landscapes. The tourists who travel to these geoparks can enjoy volcanic landscapes such as volcanic rocks, volcanic bombs, cinder cones, columnar lavas, and so on. Vulkaneifel Geopark, Kanawinka Geopark, Bohemian Paradise, Geopark Shetland, Papuk Geopark, Leiqiong Geopark, Yandangshan Geopark, and Lochaber Geopark are categorized in this group.

- Group B (tourist attractions in the tectonic area) is famous for its tectonic landscapes such as faulting and folding. Itoigawa Geopark, Psiloritis Natural Park, and Gea Norvegica Geopark are classified in this group.

- Group C (Fossil tourism) is famous for its fossil tracks such as Naturtejo Geopark, Arouca Geopark, Réserve Géologique de Haute-Provence, Hateg Country Dinosaurs Geopark, Geo and Naturepark TERRA.vita, Swabian Alb Geopark, Parque Cultural del Maestrazgo , and Araripe Geopark

- Group D (tourism and mining) is famous for its mining activities such as Sobrarbe Geopark, Copper Coast Geopark, Geological, Mining Park of Sardinia, and Geopark Harz Braunschweiger Land Ostfalen,

- Group E (Cave or karst tourism) is famous for its Cave and karst tourism; as a branch of geotourism, it has gained popularity in geoparks such as Marble Arch Caves Global Geopark, Nature Park Eisenwurzen (the first caves with electric lights), Qeshm Geopark and Langkawi Geopark.

- Group F (glacier tourism) is famous for the development and conservation of glacier tourist resources in geoparks such as Magma Geopark and Parco Naturale Adamello Brenta.

It is worth mentioning that all geoparks include various kinds of geological heritage sites, but the aforementioned category is based on the unique geological patrimony in each geopark.

Regarding the development of thematic geotourism, educational activities and popularization of geo-sciences, most geoparks belonging to group C (fossil tourism) try to make geo-products – products based on geological heritage – such as local cookies shaped like fossils. Thus geo-products not only offer local flavours to tourists and schoolchildren but promote their geo-knowledge and the local economy as well.

In addition, establishing theme museums and geo-rooms in geoparks classified in group A (volcano tourist attractions) and D (tourism and mining) are other innovations for the development of thematic geotourism; for instance, Vulkaneifel Geopark established maar, volcano, and iron museums in its territory. Moreover, Mining Park of Sardinia with inaugurating a geomineral and coal museum offers geological sciences to visitors. The visitors can see the erupting neon volcano in the geology room of the visitor centre of Kanawinka Geopark.

Besides theme museums, the establishment of seven thematic networks in European Geoparks is another innovative strategy regarding the exchange of geo-knowledge and development of thematic geotourism.

Furthermore, cave tour books, cave tours, cave tour guides, cave virtual tours, and so on which are the geotourist facilities supported by geoparks are categorized in group E (cave or karst tourism).

Consequently, acquiring experience through the comparison of geoparks can present a supportive method and a brainstorm tool to discover new strategies for geotourism development and better management of geoparks.

Experiences gained from geoparks around the world can be a guideline for proposed and aspiring geoparks which want to become a member of UNESCO Global Geopark Network.

CHAPTER 4- Sustainable Tourism in UNESCO Global Geoparks Network

Part 2- Findings of the Empirical Study at International Level

4.2.1. Profile of UNESCO Global Geoparks

4.2.1.1. Introduction

Sustainability as a general concept for tourism has three inter-connected aspects: environmental, sociocultural, and socioeconomic; furthermore, geotourism follows sustainability principles. This part focuses on three dimensions of sustainable tourism in geoparks. The purpose of this chapter is to test the hypotheses stated in chapter three.

In this chapter the main objective is to introduce geoparks and geotourism as a gateway to rural development and sociocultural sustainability.

Regarding this, samples from 25 geoparks were compared. Data were analyzed using the SPSS software, and results profiled by frequencies.

The European Geopark Network and the UNESCO Global Geoparks Network have introduced geotourism as one of the main targets for geoparks in parallel with conservation and education. For that purpose it is crucial to apply the network concept to geotourism activities, therefore, section 4.2.1.5, is aimed at analysing the network activity between geoparks and evaluating the connectivity rate of the Global Geoparks Network and the European Geoparks Network

This chapter starts with sociocultural sustainability in geoparks, followed by examining the role of establishment of geoparks in socioeconomical and socio-environmental impacts on rural areas, and concludes by introducing innovative strategies and innovation in geoparks for the development of geotourism and rural development.

4.2.1.2. Sociocultural Sustainability in Geoparks

The aim of this section is testing the following hypotheses:

- H5: Geoparks contribute to promoting regional geotourism products and local products
- H6: Geoparks promote geotourism through innovative strategies
- H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by the local communities

This section raises the issue of whether the establishment of geoparks is a gateway for cultural sustainability and local identity preservation in rural areas or not.

According to some authors: Xun and Milly, 2002; Tingshan, 2004; Zouros, 2004; Collyer, 2007; Mendoza and Navarro, 2007; Poch, 2007; Andrăşanu and Giraud, 2009; Marques, 2009; Fassoulas and Zouros, 2010; McKeever *et al*., 2010, and Weber, 2009, geoparks can play a role for cultural sustainability in rural areas.

Organizing regional fairs and festivals, establishing cultural trails and museums, rebuilding historical places, creating geo-products and promoting local products and handicrafts are examples regarding cultural preservation in geopark territories.

Since creation of geoparks plays a role in promoting local cuisine, products, and handicrafts as cultural components, the questions were designed around local marketing. The questionnaires sent to all geoparks around the world address several topics related to regional food, products, agricultural products, souvenirs, and craft products which are illustrated in Table 4.2.1.

The first question inquires into the awareness of the role of geoparks in promoting regional food and craft products. The second question evaluates the methods which are applied by geoparks to promote regional products.

Table 4.2.1- Descriptive analysis of cultural sustainability questions in geoparks around the world (numbers of samples are 25 geoparks)

Variable	Yes	No
	Percent	
Geopark promotes regional food and craft products	80.0	20.0
Efforts which are taken to create and promote regional geotourism products of the geopark		
- Producing regional and/or ecological products in restaurants	44.0	56
- Organizing local markets for regional and agricultural products	24.0	76.0
- Providing a label for regional food or local gastronomy	28.0	72.0
- Making casts and souvenirs	56.0	44.0
- Serving local food on tours	52.0	48.0
- Creating initiative activities	48.0	52.0

Based on the result of this descriptive analysis, geopark activities help to promote regional food and craft business. It is noteworthy that for the majority of respondents (80.0%), geopark creation plays a role in promoting local cuisine, local products, and handicrafts as cultural components.

Regarding the promotion of regional geotourism products in geopark territory, each geopark applies a method (Figure 4.2.1): some of them serve local food and products on tours (19%) or restaurants (16%) and some geoparks create local businesses under the geopark brand or using a local label for products (10%). Furthermore, 9% of geoparks organize regional, agricultural product marketing, and 21% establish souvenir shops in geopark villages. 18% of the respondents' activities are all innovation such as producing geo-products – local products which are related to the geopark activities or are the symbol of the geopark – certifying agricultural products by use of the local logo, holding workshops on local products, exhibiting local products, providing handicrafts and folk music during regional festivals and fairs, serving local products in conferences, promoting regional and international media, and publishing books and booklets.

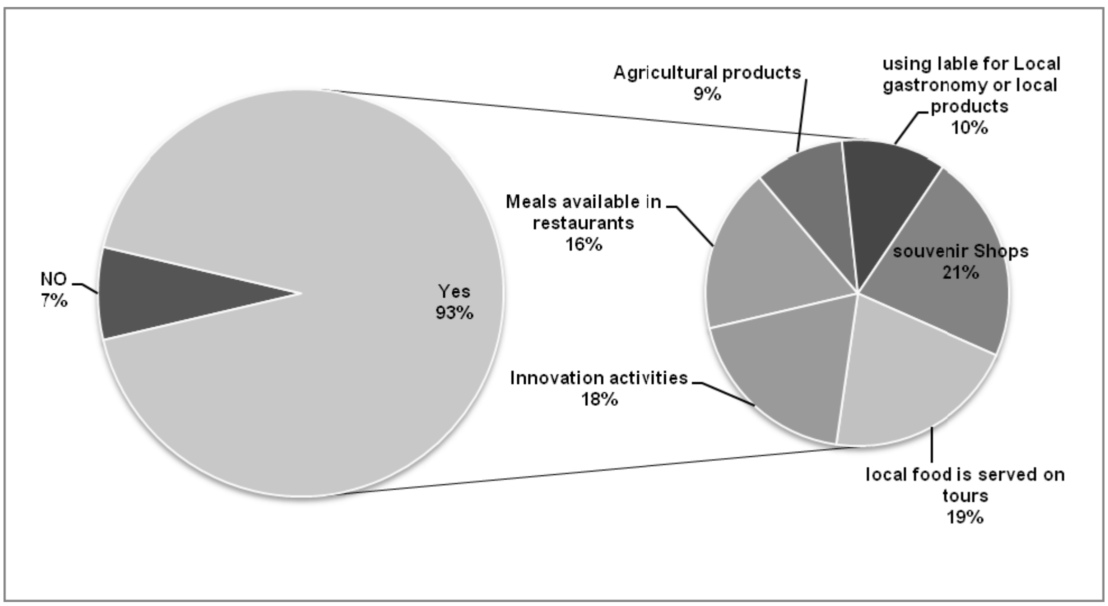


Figure 4.2.1- Percentage of respondents to "Which efforts are taken to create and promote regional geotourism products of the geopark?" (Source: Farsani *et al.*, 2012b)

The following examples were supplied by respondents to the open question about the cultural sustainability strategies of geoparks in their territory.

The Langkawi Geopark (Malaysia) exposes Malay herbal treatments and ancient health rituals to tourists. Moreover, in order to prevent the demise of the local language in the geopark territory, a geopark song has been sung in the local language which is available on the Langkawi Geopark website.

The Naturtejo Geopark (Portugal) holds regional and national festivals featuring such aspects as traditional soup, local cheeses, olive oil, pottery, bread, and green beans to revive the local products and traditional culture. Designing a geopark calendar is another strategy for rural cultural sustainability in Naturtejo Geopark. The geopark calendar not only conserves the local culture and events in geopark but also is a way to reduce mass tourism. For instance one of the festivals in Naturtejo Geopark is the chestnut festival which is held in November, and normally autumn is not a high tourist season.

The Qeshm Geopark (Iran) holds a seafood festival several times a year to improve the local economy and introduce local food. In the Qeshm Island, the sea and fishing play a major role in people’s livelihood. The other festival titled *Nowruz Sayyad* as a traditional celebration is organised by the geopark at the beginning of the main fishing season in late July. At this time local fishermen stop fishing, because they believe that the fish should have a chance to reproduce.

As *Halloween* is an annual holiday observed on October 31 – primarily in Ireland, Scotland, Canada and the United States – Copper Coast Geopark located in Ireland attempts to preserve this national festival in its territory through holding workshops such as Pumpkin Carving during *Halloween*. Waterford Harvest Festival is another festival that this geopark tries to preserve. Meanwhile, Copper Coast Geopark (Ireland) attempts to revive the Copper Coast women's initiative with items such as food, beverages, and crafts.

In addition, officials of Romania’s geopark (Hateg Country Dinosaurs) established a small centre for promoting local products, handicrafts, and souvenirs. They arrange meetings with local producers in order to exchange of knowledge for development of local business. Furthermore, Hateg Country Dinosaurs Geopark has published a book about local cuisine.

In another European geopark, Parco Naturale Adamello Brenta (Italy), a project has been extended titled “*Qualita Parco*” for agro-alimentary products and to certify agricultural products under the local park quality logo. A basket of park products that includes 14 typical products from protected area has been created (Ilaria, 2011).

With the aim of reviving local handicrafts, Arouca Geopark (Portugal) organizes handicraft competitions with geopark themes (appendix 34).

The findings also illustrate that geoparks attempt to boost cultural pride and to revive traditional food, local arts, and traditional culture through exposing them to tourists; thereby geoparks, by promoting geotourism marketing and innovative strategies, can help to reduce the negative sociocultural impacts of tourism in their territory.

To give a more detailed description of the role of geoparks on cultural sustainability and minimization of negative sociocultural impacts of tourism, the cultural activities of 25 geoparks are summarized in Table 4.2.2.

Table 4.2.2- Key strategies applied in geoparks for sociocultural sustainability (countries that replied to the questionnaires)

(Source: Farsani *et al.*, 2012a, 2012b)

NO	Country	Geopark name	Key Strategies for cultural sustainability
1	Greece	Psiloritis Natural Park	- Creating geo-products such as decorative or utilitarian ornaments, commemorative goods from stone or wood, furniture, children's toys, and clothes which are symbols of the geopark - Holding open-air painting festivals
2	Spain	Parque Cultural del Maestrazgo	- Establishing the history museum in Mas de las Matas - Establishing the cultural park of Molinos
3	Spain	Sobrarbe Geopark	- __
4	Portugal	Naturtejo Geopark	- Designing a geopark calendar for events - Creating geo-bakery and geo-restaurant - Holding regional and national festivals such as traditional soup, cheeses, olive oil, pottery, bread, watermelon, and green beans - Organizing holy walking in the geopark during Easter - Holding workshops in making artisan candles, bread, and pottery (this activities preserve traditional culture) - Holding lectures for hotel guests about the Easter traditions of Idanha-a-Nova during Easter - Holding a festival of local wines and handmade liquors - Organizing a fair of local products, gastronomy and bread - Establishing Olive Oil Route - Organizing a fair around the new earth products
5	Portugal	Arouca Geopark	- Encouraging local schoolchildren to dress up like trilobites, raft boats, and Arouca geopark customs in carnivals - Preparing a geo-dessert book (a book with some ornamental desserts in geological elements) - Organizing a geo-art competition for local artists
6	Italy	Geological, Mining Park of Sardinia	- Holding cultural festivals such as peasant marriage rituals, traditional costumes, and the rituals of holy week - Serving regional food (with local music) during fairs and cultural events
7	Italy	Parco Naturale Adamello Brenta	- Certifying agricultural products under the local park quality logo

Table 4.2.2- Key strategies applied in geoparks for sociocultural sustainability (countries that replied to the questionnaires, (cont.))

(Source: Farsani *et al*., 2012a, 2012b)

NO	Country	Geopark name	Key Strategies for cultural sustainability
8	Croatia	Papuk Geopark	- Making souvenirs based on natural and geological heritage of the geopark - Holding traditional tournaments such as Medieval Knight Tournament
9	Romania	Hateg Country Dinosaurs Geopark	- Publishing books about local cuisine - Establishing a small centre for promoting local products, handicrafts, and souvenirs - Creating geo-products such as dinosaur bread, etc. - Holding a meeting for geopark officials and local producers - Organizing a new course on 'Local Tradition' which was introduced to the local curriculum for 11 – 12-year-old children
10	Austria	Nature Park Eisenwurzen	- Organizing medicinal herb tours - Holding courses on aromatherapy - Offering various herbal teas, herbal salts from wild herbs, flowers, salts, floral, and herbal skin care products - Preparing stone pine schnapps - Organizing geotourism markets and producers of common marketing under the geo Line brand (geopark brand)
11	France	Réserve Géologique de Haute-Provence	- Linking craft businesses to the Reserve network and making products based on the geological elements (bakeries, pastries, ammonite chocolate, carvers, and ceramic makers)
12	Czech Republic	Bohemian Paradise	- Holding the traditional September festival
13	Germany	Swabian Albs Geopark	- __
14	Germany	Vulkaneifel Geopark	- Creating a geo-cocktail such as Vulkaneifel Mineral Water cocktails
15	Germany	Geo and Naturepark TERRA.vita	- __
16	Germany	Geopark Harz . Braunschweiger Land Ostfalen	- Holding glass blowing workshops for visitors
17	Ireland	Copper Coast Geopark	- Designing a geopark calendar

Table 4.2.2- Key strategies applied in geoparks for sociocultural sustainability (countries that replied to the questionnaires, (cont.)) (Source: Farsani *et al*., 2012a, 2012b)

NO	Country	Geopark name	Key Strategies for cultural sustainability
17	Ireland	Copper Coast Geopark	- Establishing an artwork centre - Encouraging the Copper Coast women's initiative such as food, beverages, and crafts - Holding Christmas Markets, festivals and exhibitions - Holding a competition by the officials for geopark themed cake - Holding craft workshops
18	North Ireland	Marble Arch Caves Global Geopark	- Designing a geopark calendar for events - Introducing the first unique strategy for sustainable development
19	Scotland	Lochaber Geopark	___
20	Norway	Gea Norvegica Geopark	- Designing a geopark calendar
21	Malaysia	Langkawi Geopark	- Providing a geopark song video in the local language - Promoting Malay herbal treatments - Promoting ancient rituals and health
22	Iran	Qeshm Geopark	- Holding traditional tournaments during festivals - Holding festivals such as Nowruz Sayyad Festival, Sea food festival, Summer festival and so on
23	Japan	Itoigawa Geopark	___
24	Australia	Kanawinka Geopark	- Organizing local markets such as: Mount Gambier Markets (every Saturday) and Blue Lake Market (every Sunday) - Designing a calendar of annual events
25	Brazil	Araripe Geopark	- Holding an xylography exhibition of local artists - Exhibiting transformation of leather into saddles, harnesses, bags, and sandals - Holding an agriculture exhibition in July including an agriculture fair, auction of animals, local food, local concerts, and cultural attractions

4.2.1. 3. Socioeconomic Impacts of the Establishment of Geoparks

Since geoparks are pioneers in geotourism and are examples of sustainable local development, in this study we try to discover strategies that are applied in geoparks to improve the local economy and local business. This section is specifically concerned with the effect of the establishment of geoparks on development of the local economy through geotourism and creating new job opportunities. Regarding this, this section aims at testing the following hypotheses:

- H3: Geotourism activities in geoparks create opportunity for local development
- H4: Using geotourism can be a useful strategy for developing tourism in geoparks
- H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories
- H9: Geoparks do not function similarly in terms of management

By comparing twenty-five different geoparks as geotourism destinations in Europe, Asia, Australia and South America we accessed various strategies of tourism development and development of the local economy in geoparks. Furthermore, in this section we follow the specific objectives that are mentioned below:

- To improve the local economy
- To identify the role played by geoparks in improving the living conditions of the local population
- To engage the local communities in geotourism and geopark activities
- To evaluate the role played by tourism in achieving better quality of life and education for local population and stimulating economic growth

4.2.1.3.1. Strategies Applied for Development of the Local Economy in Geopark Territories

Since geoparks are new model of sustainable development and protection of nature, some questions were designed to investigate which geoparks are under the supervision of which organisations (Table 4.2.3). According to results of descriptive analyses in Table 4.2.3, the majority of geoparks (52%) are managed officially, and in most countries geoparks (52%) are financially supported by local municipalities. Thus, geoparks are established at an international level but managed at a local level.

In view of the fact that geopark activities are interdisciplinary, the observations illustrate that all geoparks cooperate with other organizations such as tourism sectors, universities, schools, environmental organizations, national parks, geological and geographical organizations, NGOs (Non-Governmental Organizations), private sectors, museums, etc.

It can be said that the establishment of geoparks created some direct job opportunities. It is evident that the numbers of indirect job opportunities which appeared through development of geotourism and geopark activities is more than the direct jobs in geopark territories.

Table 4.2.3 - Descriptive analysis of questions regarding management structure of geoparks

Questions	Yes
	Percent
What is the management structure of geoparks in your country?	-
• Public administration	52.0
• Private administration	8.0
• Both	40.0
Which organizations financially support geoparks in your country?	-
• Municipality	52.0
• Tourism department	4.0
• Environment department and Municipality	20.0
• Other	24.0
Percentage of employees who work in the geopark?	-
• Full time	12.0
• Part time	16.0
• Both	72.0
Does the geopark cooperate with other organizations and companies?	100

Pursuant to some authors such as: Xun and Milly, 2002; Xun and Ting, 2003; Zouros, 2004; Geraldes and Ferreira, 2009; Rodriguse and Carvalho, 2009; Eckhardt, 2009; Dowling, 2009; Turner, 2008; McKeever *et al.*, 2010, and Zouros, 2009; the establishment of geoparks in rural areas can play an important role in the development of the local economy. Promoting geotourism and ecotourism to attract more tourists, creating new job opportunities such as establishment of geo-restaurants, geo-bakeries, family guest houses and geotours, promoting local products and geo-marketing under the geopark brand, creating job opportunities in the form of second job, part time and seasonal job, and involving local communities in geopark activities are good examples for the development of the local economy in geoparks territory.

In order to gain experiences from geopark authorities' knowledge, we designed some questions (Table 4.2.4) that reflect the role of geopark establishment in the development of the local economy.

The first question inquires into the awareness of geopark activities in the prosperity of the local economy. The second question evaluates whether geoparks provide second jobs or seasonal job opportunities for local communities. The third, fourth, and fifth questions ask whether geoparks involve locals in conservation activities, workshops, and geopark team work.

Table 4.2.4 - Statistical analysis of strategies regarding tourism, conservation, and education activities applied to promote local economy in geoparks

Questions	Mean	SD	N	Missing	Yes	No	No answer
What efforts are undertaken to promote links between the geopark and the local economy?	-	-	-	-	-	-	-
• A label given to the regional services	-	-	25	0	36%	64%	-
• Direct marketing for regional products	-	-	25	0	36%	64%	-
• Tourism offers including tours of collaboration with local businesses	-	-	25	0	80%	20%	-
• Links with other local activities (boating, bird watching, cultural activities, etc.)	-	-	25	0	68%	32%	-
How many employees of the geopark are locals?	18.32	27.68	25	0	-	-	-
Does the geopark create second or seasonal job opportunities for local communities?	-	-	25	0	48%	52%	-
Does the conservation of the geopark improve the local economy?	-	-	24	1	83%	13%	4%
Are the workshops managed by locals?	-	-	24	1	68%	28%	4%

Based on the result of descriptive analysis (Table 4.2.4 and Figure 4.2.2) the majority (80%) of respondents believe that in geopark territories, involving local businessmen in tourism marketing such as tours, is the best way to promote the local economy; moreover, 68% of geoparks try to link their activities with other local tourism activities such as boating, bird watching and cultural activities, for example. Aside from tourism marketing, geoparks, with a view to local economic development, strive to support local products and services through a label (36%) or direct marketing of regional products (36%).

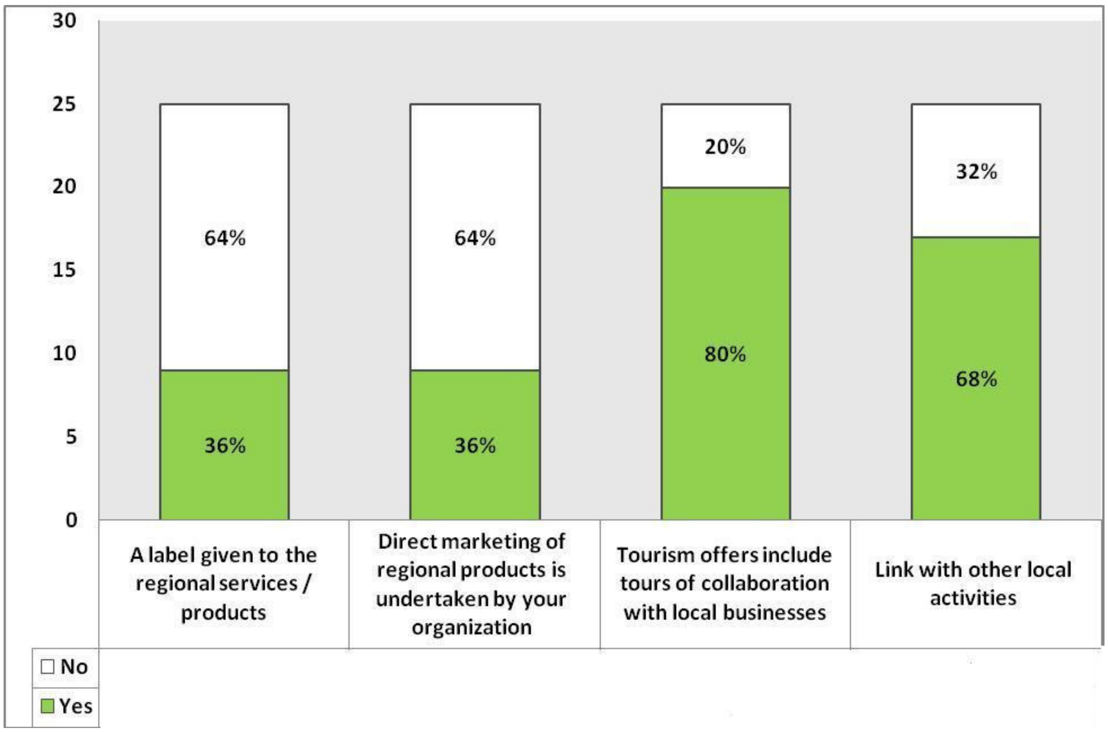


Figure 4.2.2 - Percentage of replies to the different economic strategies in order to promote links between geoparks and the local economy (Farsani *et al.*, 2011a)

Observations (Figure 4.2.3) demonstrate that by the end of 2009, geoparks in each territory employed an average of about 18 local persons in the geopark structure (mean = 18.32, standard deviation [SD] = 27.68). Obviously, the average numbers of local people who are involved in all geopark activities is more than 18 persons since geoparks, through conservation activities, educational programmes, festivals, fairs, workshops, tourism and geotourism, engage large numbers of locals and volunteer workers in geopark actions in the form of part- or full-time work, seasonal and second jobs. It is noteworthy that 48% of geoparks, through providing second or seasonal job opportunities for local communities, attempt to generate supplementary income for them (Table 4.2.4).

According to questionnaires filled in by authorities, during the summer time (from May to October), Parco Naturale Adamello Brenta (Italy) authorities employ 40 temporary staff who usually work in the 'Visitor Centre', 'Environmental Educational Office' and on dates when the park carries out the sustainable mobility projects.

The Marble Arch Cave Geopark (UK) authorities also employed 35 seasonal tour guides around the geopark. Moreover, the Naturtejo Geopark (Portugal) strives to create summer business in river beaches, jobs in coffee shops near the geo-monuments, summer occupation for students working in the Paleozoic Museum and jobs maintaining the Iconological Park of Penha Garcia.

In addition, around 12 people work in the Eisenwurzen Geopark (Austria) on contract for seasonal jobs. The Réserve Géologique de Haute-Provence (France) provides seasonal jobs in the geopark for tour agencies, and the Langkawi Geopark (Malaysia) provides jobs ranging from catering services to food for tour packages as well.

Furthermore, officials of the Araripe Geopark (Brazil) try to involve local artists and producers in workshops and also, during seasonal events such as 'romarias' at the Cultural *Geotope of Juazeiro do Norte*, officials attempt to provide some new jobs for local communities such as fossil replica workers.

Results (Table 4.2.4) indicate that the majority of geopark authorities (83%) believe that conservation activities improve the local economy in their territory. The last but not the least geopark activity is holding workshops by local geologists, local artists, etc. Workshops as an educational programme are known as a conservation method in geology, and it is not only a way to preserve geoparks but also involves locals in workshops and promotes the local economy. Results demonstrate that the majority of geoparks (68%) emphasize holding workshops by local communities.

The next sections will discuss details about conservation and educational activities in geoparks.

Consequently, geoparks play an innovative role for entrepreneurship, the creation of new jobs, and reducing the unemployment rate, especially in rural areas.

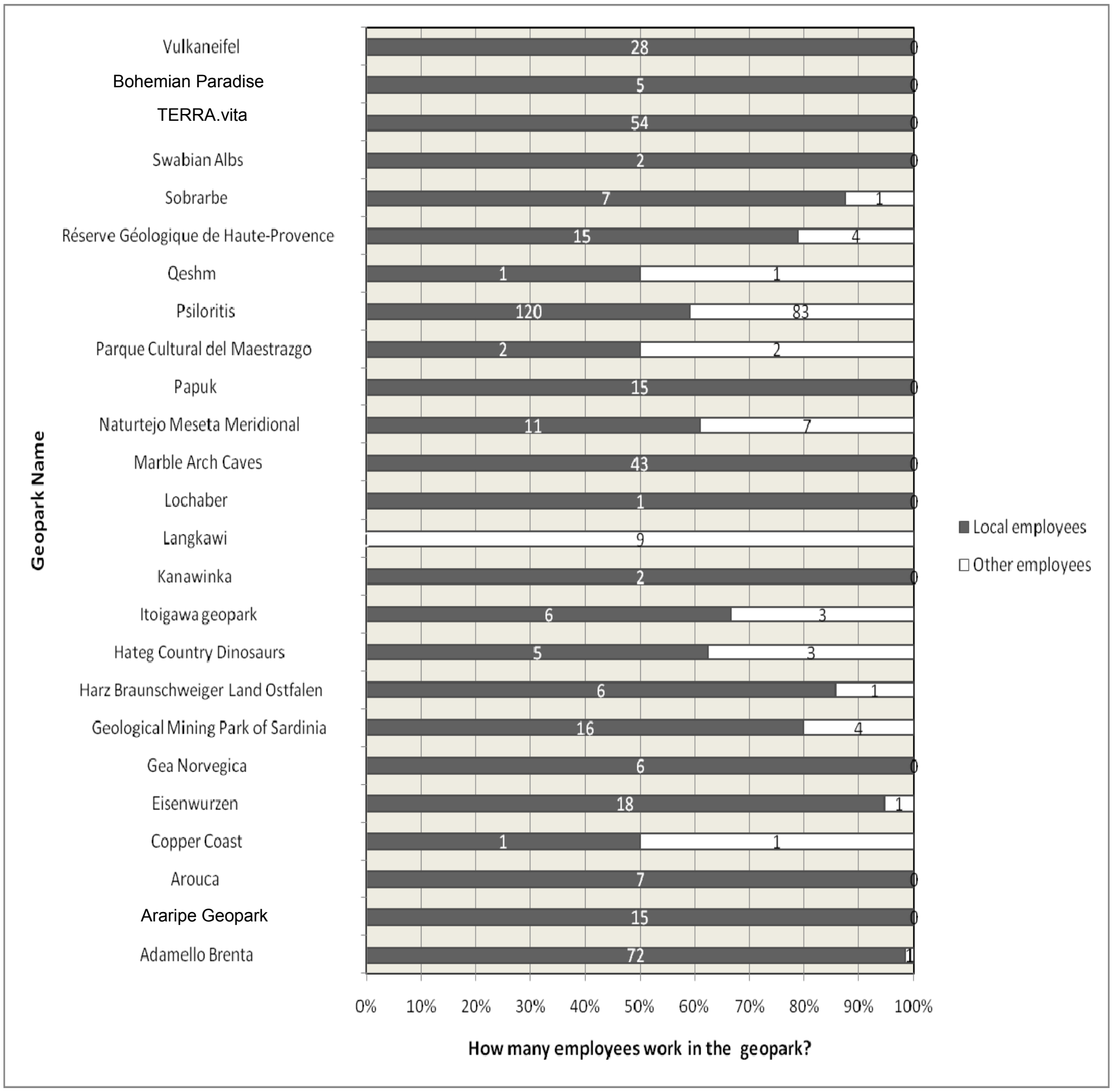


Figure 4.2.3- The numbers and the percentage of local employees (part-time, full-time or seasonal) in each geopark according to the responses to the questionnaires (Source: Farsani *et al.*, 2011a)

4.2.1.3.2. Geotourism Marketing in Geoparks

According to the National Geography definition, "*geotourism is a market of about 55.1 million travelers who seek authentic experiences, care about the protection and preservation of the places they visit, and are willing to spend more money to achieve these goals. Average ages range from 43-55 years, average household incomes are high* *with 38-46% earning more than $75,000 annually, average number of leisure trips taken each year is 4 or more, and education levels are also high".*

Moreover, some authors such as Gledhill (2008) and Boley (2009) noted that geoparks are an ideal destination for sustainable tourism and educational activities in rural areas in the world, especially in Europe. Pursuant to geopark activities and the literature review, it is evident that geoparks play an important role in the development of the local economy of their territories through increasing the number of visitors and promoting geotourism. Regarding this, some questions were designed to reflect the relation between tourism marketing and geoparks.

The first question is an initial attempt to investigate the relationship between geoparks and the tourism sector. The second one evaluates the role of geoparks in the development of the local economy in the tourism sector. The third question assesses demand indicators for tourists in geoparks, and the fourth and last questions inquire whether the local communities are stakeholders in geopark activities in the form of geotourism or not.

Table 4.2.5- Descriptive analysis of tourism activities questions in geopark

Questions	**Yes**	**No**
	Percent	
Does the geopark have close collaboration with the tourism sector	96.0	4.0
Visitors benefit the local businesses in geoparks by:		
- Buying entrance tickets	44.0	56.0
- Participating in geopark tours	80.0	20.0
- Buying souvenirs	80.0	20.0
- Participating in workshops and conferences	48.0	52.0
- Other	20.0	80.0
Do you count the visitors?	40.0	60.0
The geopark engages the locals as guides and park guards	88.0	12.0
Local people are stakeholders in the tourism sector	84.0	16.0

Based on the results of descriptive analysis (Table 4.2.5), the majority of geoparks (96%) have a close collaboration with tourism sectors.

The European Geoparks Network and The Global Geoparks Network hope that this cooperation promotes geoparks as a premiere tourist destination, and at the same time paves the way to build a better and greater understanding in protecting the natural environment.

It is evident that in geoparks, visitors benefit local economy (through rural accommodations, shops, souvenirs, restaurants, handicrafts, recreation activities, educational programmes, etc.).

By the end of 2009, samples indicate that just 40% of geoparks count visitors, and among geoparks only 13 geoparks replied to the question (Do you count the visitors?). The results of the descriptive analysis of secondary data (Table 4.2.6) illustrate that annually an average of 7.8 million geotourists visits geoparks around the world; this number of geotourists in the European geoparks is about an average of 4.3 million per year. Moreover, the average of the maximum duration of stay of geotourists is estimated at 4.7 days in geoparks; the number of overnight stays is one measure for the economic importance of tourism for a region.

Among geoparks, Langkawi Geopark (Malaysia) with 2,000,000 visitors per year is above all in the samples.

Therefore, geoparks are known as the geotourist destination in the recent decade. Regarding tourism asset attraction, each geopark applies a method to promote the local businesses by visitors (Table 4.2.5). Some geoparks generate income by selling entrance tickets (44%); some of them try to involve visitors in geopark tours (80%), and some encourage tourists to buy souvenirs (80%). Furthermore, 48% of geoparks strive to engage visitors in workshops and conferences; these educational activities represent the key elements for a successful implementation of the geopark conservation and geoparks' strategy at the local community level.

20% of respondents selected the option “other” and they mentioned museums, educational field trips, local restaurants, local accommodation, shops, pubs, food, coffee shops, bars, and outdoor activities as tourism activities which can improve the local economy in geoparks.

Besides this, 88% of geoparks engage locals as guides, park guards, or other posts related to the tourism sector. Respondents believe that geoparks employ an average of 27 (SD= 45.387) persons as guides or park guards. It is noteworthy that, by the end of 2009, 84% of geopark authorities declared that locals are stakeholders in the tourism sector of geoparks.

Table 4.2.6- Annual visitor arrivals in geoparks (at the end of 2009)

Geopark	Visitors (per year)	Foreign visitors (per year)	Domestic visitors (per year	Maximum duration of stay
Araripe Geopark	19920	504	19416	3
Arouca Geopark	20000	2000	18000	2
Bohemian Paradise	-	-	-	-
Copper Coast Geopark	-	-	-	14
Gea Norvegica Geopark	-	-	-	-
Geo and Nature park TERRA.vita	-	-	-	-
Geological, Mining Park of Sardinia	-	-	-	-
Geopark Harz. Braunschweiger Land Ostfalen	-	-	-	-
Hateg Country Dinosaurs Geopark	30000	6000	24000	7
Itoigawa	1400000	0	1400000	1
Kanawinka Geopark	-	-	-	-
Langkawi Geopark	2000000	600000	1400000	7
Lochaber Geopark	1000000	90000	910000	-
Marble Arch Caves European Geopark	65000	0	65000	-
Naturtejo Geopark	350000	70000	280000	1
Nature Park Eisenwurzen	120000	12000	108000	3
Papuk Geopark	7000	140	6860	1
Parque Cultural del Maestrazgo	-	-	-	-
Parco Naturale Adamello Brenta	925771	138865	786906	7
Psiloritis Natural Park	-	-	-	-
Qeshm Geopark	-	-	-	-
Réserve Géologique de Haute-Provence	35000	3500	31500	6
Sobrarbe Geopark	-	-	-	-
Swabian Alb Geopark	-	-	-	2
Vulkaneifel Geopark	1800000	630000	1170000	4
Sum	7772691	1553009	6219682	58
Mean	-	-	-	4.4
SD	739023.070	224323.816	566943.550	3.718
European Geoparks	4352771	952505	3400266	4.7

4.2.1.3.3. Geotourism Marketing under the Geopark Brand and Eco-labels

The last but not the smallest strategy for development of geotourism and the local economy is applying the geopark brand or eco-labels in geotourism marketing (in festivals, publications, research projects, common marketing, higher prestige, accommodations, restaurants, educational programs, and local businesses).

According to Table 4.2.7 the majority (84%) of geopark authorities noted that geotourism markets take advantage of the geopark brand, and 68% of respondents filled in on the form that the geopark brand can play a role in the development of the local economy.

Table 4.2.7- Descriptive analysis of the role of geopark brands in the development of local economy

Questions	Yes	No
	Percent	
The geopark has a brand and logo of its own	100	-
Geotourism markets take advantage of the geopark brand	84.0	16.0
The brand plays a role in the development of the local economy	68.0	32.0

Among geoparks, Vulkaneifel Geopark (Germany), Nature Park Eisenwurzen (Austria), Naturtejo Geopark (Portugal), Psiloritis Natural Park (Greece) Cabo de Gata - Nijar Natural Park (Spain), Naturepark TERRA.vita European Geopark (Germany),and Parco Naturale Adamello Brenta (Italy) more than other geoparks emphasize the use of the geopark logo or eco-labels for promoting local businesses and geotourism; for example, the Parco Naturale Adamello Brenta launched a project titled as “*Qualità Parco*”. This project tries to use the logo as a local environmental / marketing certification for hotels and local products. Moreover, the brand is used for agro-alimentary products as well.

Among the geoparks, Parco Naturale Adamello Brenta (Italy) is the first geopark in Europe which obtained ISO 14001 certification; the park can also boast EMAS registration (Moranduzzo, 2008). Furthermore, currently, Geo-Naturpark Bergstraße-Odenwald (Germany) is implementing ISO EN 9001 standards for the development of the management framework and regional development (Eckhardt, 2011).

Cabo de Gata-Nijar Geopark (Spain) implemented the European Charter for Sustainable Tourism (ECST) in its territory and it uses accordingly the logo of the ECST for its activities (Elviro *et al*., 2011).

Besides, Naturtejo Geopark has close collaboration with a geo-bakery located in the geopark, and has permitted them to use geopark brand on their geo-products as souvenirs. Moreover, this geopark established a shop of the Earth (*Loja Da Terra*) in order to supply the geopark products. This shop can benefit from the geopark logo for its products.

Also, in the Nature Park Eisenwurzen, geotourism markets and producers have common marketing under *Geo Line* brand (local geopark brand).

In addition, Psiloritis Natural Park (Greece) runs a project titled “Land of Psiloritis”; it is carried out in cooperation with local stakeholders (taverns, accommodation places, agritouristic enterprises etc.) who apply the geopark logo as the brand name for a network of cooperating enterprises. Members have to fulfil certain quality standards that have been set in collaboration with the geopark and are evaluated every year by a common group of specialists.

Some geoparks such as Vulkaneifel Geopark (Germany) and Cabo de Gata - Nijar Natural Park (Spain) use regional eco-labels as a badge of quality and environmental management. Vulkaneifel Geopark (Germany) applied to the *Eifel* brand as a regional brand for its activities. The Eifel region (Vulkaneifel Geopark) is a natural area with a unique character, known for its attractive landscape and as a region of origin of high-quality products with the new regional brand “e” which can be recognized directly by consumers at the special quality of the Eifel. The brand logo is symbolized with a yellow “e”; this brand is a multipurpose brand and is used for agriculture, forestry, trade, tourism activities, and local products.

Moreover, Cabo de Gata - Nijar Natural Park (Spain), in order to have sustainable economic activities in the geoparks, applied the Nature Park of Andalucía brand. The brand can be used for handicrafts, nature tourism services and natural products (Villalba, 2010). The Nature Park of Andalucía brand was promoted by the regional environmental government of Andalucía.

Viabono is a National tourism brand in Germany. Geo and Naturepark TERRA.vita European Geopark (Germany) has been qualified by this brand, and the *Viabono* brand guarantees the special experience of travel around the geopark.

Furthermore, North Pennines European Geopark (UK) has used The Green Tourism Business Scheme (GTBS) as an environmental accreditation for the geopark (North Pennines Geopark Authorities, 2007). This eco-label is been designed to guide visitors in tourism destinations and help them to select promoters of ecotourism products and the new experiences which are offered by destinations. It is also designed to act as a framework for operators to adapt existing products to ecotourism or create new ecotourism products.

It is worth mentioning that some geoparks such as the Papuk Geopark (Croatia) believe that the geotourism market has still not been developed in the country as it should be and the authorities should try to introduce a geopark brand as a sustainable tourism brand. On the basis of the results of this research, it can be concluded that geotourism marketing and the local economy can take advantage of geopark brands as well as eco-labels.

4.2.1.4. Socio-Environmental Impacts of the Establishment of Geoparks

According to some authors Strasser *et al.*, 1995; Wimbledon, 1996; Reimold, 1999; Heitzmann *et al.*, 2006; Reynard and Coratza, 2007; establishing geosites and geoparks are key components in geoconservation.

In addition, some authors such as: Catana and Rocha, (2009), and Anderson and Brown, 2010 argued that educational activities are the best means of preservation of geological heritage.

Moreover, Richardson and Shakespeare, 2009; and Geraldes and Ferreira, 2009; believe that involving local communities in geopark conservation projects can be a strategy for the preservation of geological and geomorphological heritage.

The goal of this section is to determine the role of the establishment of geoparks on socio-environmental sustainability. This section tries to test the following hypotheses:

- H1: Geoparks involve local communities in conservation activities
- H2: Geoparks have positive socio-environmental impacts on local communities
- H7:Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories

Regarding this, three open questions were designed for geoparks authorities, the first question designed to investigate the conservation activities in geoparks, the second question ask how geopark conservation improves the local economy and the third question evaluates the number of people involved in geopark conservation activities.

Organizing workshops managed by local communities is another strategy of geoparks for conservation and educational activities. Concerning this strategy, three closed questions were designed: the first question evaluates whether geoparks organize workshops or not; the second and third questions ask whether organizing workshops in geopark territories promotes the local economy.

4.2.1.4. 1. Novel Strategies for the Conservation of Natural Heritage in Geoparks

As mentioned in the methodology section, the NVivo software was used in this study to analyse the open question (Q1: what are the conservation activities) and the question two investigates how conservation of geoparks improves the local economy. These open questions introduced strategies for conservation of geoparks. Applying NVivo software identified the terms “local, geosite, educational and project” as key concepts in conservation of geological heritage.

Figure 4.2.4 illustrates the percentage of coverage of the aforementioned terms in the analysed record; and illustrates the most frequent terms in the analysed record. The term ‘local’ shows the most frequency of usage and after that is “geosite” with more frequency of strategies. Thus, locals play an important role in the conservation of geoparks, because no one knows the territory better than the local community. Moreover, finding, introducing, and establishing geosites are other strategies for the conservation of geoparks and unique geological heritage. The word “educational” has the third highest frequency, so an educational program is known as a way to conserve the geological or geomorphological heritage.

It is noteworthy that results of survey by means of NVivo software supported the expectations of the literature review.

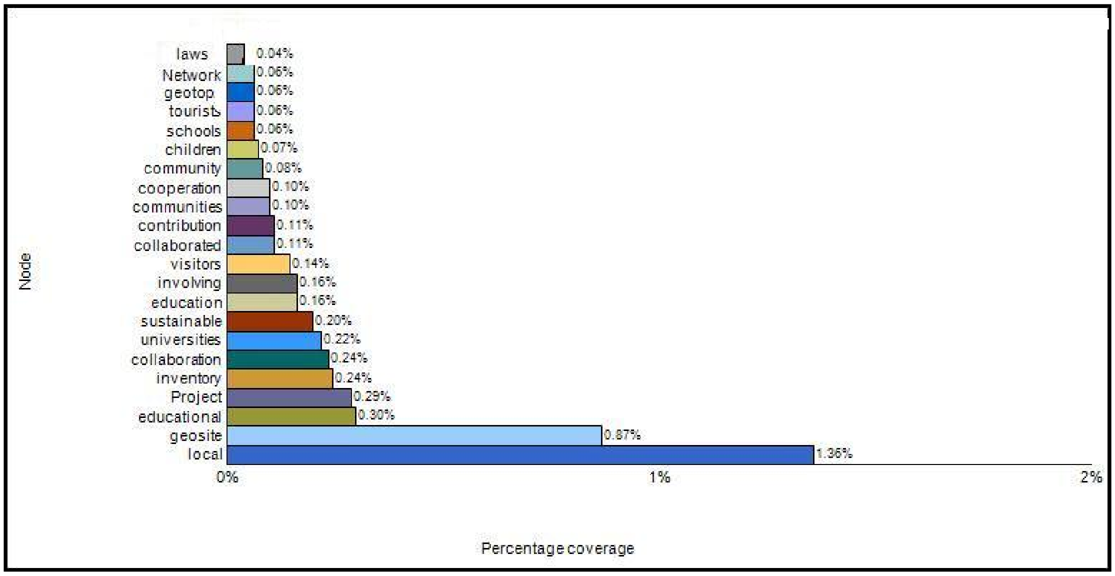


Figure 4.2.4 - Results of qualitative analysis of open questions regarding conservation strategies for geoparks by using NVivo software

It is obvious that every geopark includes some geosites; and finding, introducing, and establishing geosites are the first steps for geopark creation. Thus, according to the results obtained by NVivo software, involving local communities in the conservation of geoparks and providing educational projects are key factors in the preservation of geoparks which are explained in detail below.

4.2.1.4. 2. Involving Local Communities in Geopark Activities

On the basis of the results of NVivo software analysis and the literature review, geoparks, in order to conserve natural and geological heritage sites, utilizes the workforce and the knowledge of local communities in geopark territories.

According to the section 4.2.1.3.1, involvement of local communities in the conservation of geoparks can be a strategy to improve the local economy; the majority (83%) of geoparks authorities argued that the conservation of geoparks can create part time and second job opportunities for local communities (Figure 4.1.5).

Among respondents only 15 geoparks replied to the question (How many people are involved in conservation activities?) results illustrated that the establishment of a geopark in each territory engages an average of about 11 persons in geopark conservation activities in the form of volunteering, supplementary income, part-time, full-time ,seasonal, and second job opportunities (Mean= 10.53, SD= 14.78).

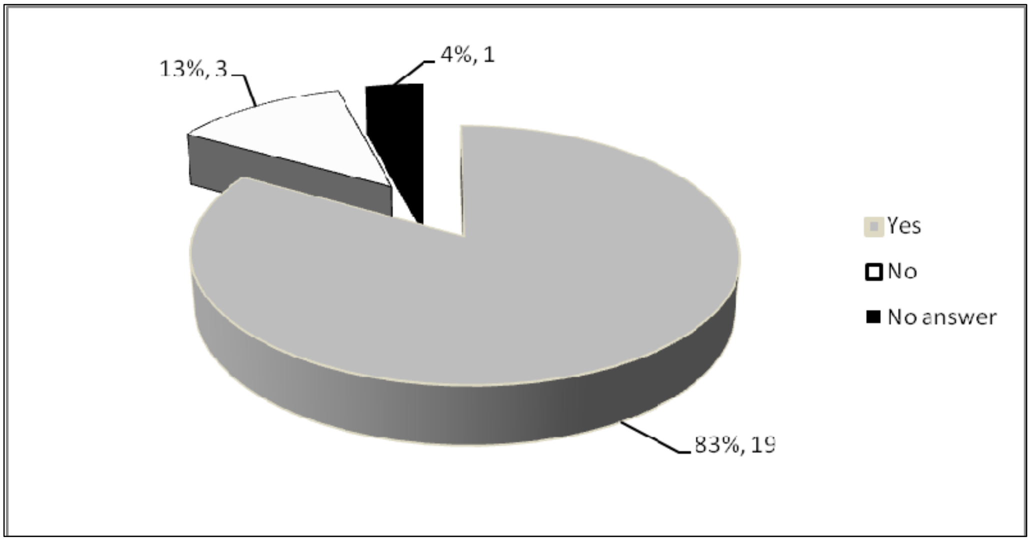


Figure 4.2.5- Percentage of geoparks which believe that the conservation of geoparks improves the local economy

In addition to examples mentioned in chapter two, respondents indicated their conservation activities as follows: Langkawi Geopark (Malaysia) has organised cleanliness programs for schoolchildren and local communities, with the collaboration of environment related NGOs (Non-Governmental Organizations) such as the WWF. Kanawinka Geopark (Australia) is another geopark which takes advantage of the local human workforce in conservation activities such as controlling weeds and pests in their territory. And Vulkaneifel Geopark (Germany) involves the locals in preventing sheep overgrazing. For instance the geopark encourages farmers to carry out special land cultivation in protected areas. It is noteworthy that most geoparks employ locals in preservation activities such as park guard and site surveillance.

Meanwhile, some geoparks such as Naturtejo Geopark, Araripe Geopark, Sardinia, etc. believe that educational programs play an important role in geopark conservation and they try to involve locals in educational activities and workshops.

Thus, the next section will focus on educational activities and workshops in geoparks.

4.2.1.4. 3. Educational Activities in Geoparks

As mentioned in the literature review, education as a fundamental prerequisite for the achievement of sustainable development is known as a conservation method in geology; thus holding workshops, establishing museums, thematic museums, thematic networks, information centres, geo-trails, providing geotourism maps, organizing geotours, guided tours, school class excursions, and outdoor laboratories, preparing maps, educational materials and displays, seminars, the annual conference of the European Geoparks Network and Global Geoparks Network and so on are strategies applied by geoparks to educate locals, children including schoolchildren, and tourists.

Holding workshops is not only a way to preserve the natural (geo and bio) and cultural heritage in geoparks, but also promotes the local economy through involving local communities in workshops. Regarding this, some questions (Table 4.2.8) were designed to inquire into the awareness of the role of workshops, which are being held in geoparks, in the local economy.

Results indicate that the majority of geoparks (72%) have been equipped with workshop facilities and 56% of geopark authorities believe that workshops improve the local economy through involving locals, artists, geologists, etc.

Table 4.2.8 - The role of workshops held in geoparks in the local economy

Variable	Yes	No	No answer	Missing
	Percent			
Geoparks have workshop facilities	72.0	28.0	0	0
Workshops are managed by locals	68.0	28.0	4	1
Workshops improve the local economy	56.0	36.0	8	2

A geopark organizes activities and provides logistic support to convey geoscientific knowledge and environmental and cultural concepts to the public. This is accomplished through protected and interpreted geosites, museums, information centres, trails, guided tours, school class excursions, popular literature, maps, educational materials and displays, seminars, and so on. A geopark also fosters scientific research and cooperation

with universities and research institutes, stimulating negotiation between the geosciences and the local population.
A plan for sustainable development in a geopark territory needs interdisciplinary studies and cooperation among universities, schools, kindergartens, museums, local authorities, and different stakeholders.

Consequently, educational activities exist in the core of geoparks' interests and operations; geoparks are open-air geological museums and can contribute significantly to environmental and cultural education programmes, offering excellent examples for the interaction between the abiotic elements and biotic parameters in natural ecosystems. They constitute natural outdoor laboratories where children can investigate earth sciences. Moreover, geoparks, by having locals participate in geopark conservation activities and workshops attempt to improve the local economy of rural areas located near geoparks.
It is obvious that preserving geological and natural heritage is not possible without tourists' and local communities' awareness. Aside from examples mentioned in chapter 2 (section: 2.10.1.2), each geopark has applied various educational activities and innovative educational tools which respondents mentioned in the questionnaires (Table 4.2.9).

Table 4.2.9 - Responses to educational activities in geoparks

Country/ Geopark name	Educational program for schools and universities	Workshop	publication	Museum
Greece (Psiloritis Natural Park)	×	×	×	×
- Organizing field activities (Two special "Educational Suitcases" have been developed by the Psiloritis Natural Park that serve for environmental educational both indoor and outdoor. These "Educational Suitcases" have been offered to all schools existing in the Park's territory, and are also available for special groups of the Park in Anogia). - Developing Educational Suitcases: Based on certain species like the Cretan Wildcat or the Psiloritis' butterfly, the program discusses the great variety of life and the peculiar ecosystems of the plateaus. Field activities, educational games, observations, and data collection are amongst the various activities supported. - Providing facilities to understand the groundwater process: This "Educational suitcase" is related to the surface and underground water routes in the carbonate rocks of the Park. It focuses on plateaus, caves, and springs, and discusses the individual ecosystems that are formed by water activity. Part of the program is also held in English.				

Table 4.2.9 - Responses to educational activities in geoparks (cont.)

Country/ Geopark name	Educational program for schools and universities	Workshop	publication	Museum
Spain (Parque Cultural del Maestrazgo)	×	-	×	×
- Publishing a number of books and leaflets (these have been published in the last ten years for every type of users: a complete scientific guidebook for university people, a short guidebook for tourists, pedagogic tools for primary and secondary schools including field notebooks and an interactive CD published in 2004 and widely circulated among teachers, and a comic for children). - Restoring an ancient industrial building for use as a visitor centre of the Aliaga Geopark (It includes a room that can be used both as a laboratory for students and as a lecture room for small meetings, conferences, or workshops)				
Spain (Sobrarbe Geopark)	×	×	×	×
- Establishing a space for introducing the Sobrarbe Geopark - Establishing the Technical Office - Establishing the Geovision Room - Establishing trails for pupils 12 to 16 (such as: karst trail, glacial landscape trail, fluvial trail) - Establishment of Paleontological Park of Galve in Aragon Spain (Barco *et al*., 2004).				
Portugal (Naturtejo Geopark)	×	×	×	×
- Organizing educational programs for schoolchildren in two steps: School Meets the Geopark and Geopark goes to School - Providing courses in Geo-conservation - Holding a workshop titled as “How *Cruziana* was formed” for the local students and their parents - Organizing a dinosaur exhibition in 2010 and celebrating the international mountain day - Organizing professional courses of environmental management and food quality control and processing - Preparing a Braille book of Naturtejo Geopark for blind children				
Portugal (Arouca Geopark)	×	×	×	×
- Holding a workshop titled as “Make your own Trilobite” - Running a project titled “Geoteca” in school libraries - Organizing educational activities for schoolchildren in two steps: Geopark Goes to School and School Goes to Geopark - Holding a Palaeozoic era exhibition in 2010				
Italy (Geological, Mining Park of Sardinia)	×	×	×	×
- Trying to sensitize the public and the locals to the main thematic matters connected to the main aim of the geopark through holding workshops on themes such as sustainable tourism, industrial archaeology, preservation, geology, and economical activities				

Table 4.2.9 - Responses to educational activities in geoparks (cont.).

<table>
<tr><th>Country/ Geopark name</th><th>Educational program for schools and universities</th><th>Workshop</th><th>publication</th><th>Museum</th></tr>
<tr><td>Italy
(Parco Naturale Adamello Brenta)</td><td>×</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Holding workshops on the European Charter of sustainable tourism, geoparks, Dolomites and so on managed by locals
- Establishing Museum della Malga which exhibits ancient Alpine culture in this geopark</td></tr>
<tr><td>Croatia (Papuk Geopark)</td><td>×</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Organizing educational activities such as seminars, protection and promotion of geo-heritage, establishing museums, information centres, and roads, providing trips with expert leadership, publishing popular-scientific literature and educational materials, etc.</td></tr>
<tr><td>Romania (Hateg Country Dinosaurs Geopark)</td><td>×</td><td>-</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Providing educational packages for children in local schools and involving them in indoor and outdoor activities
- Organizing a new course on ‘Local Tradition’ which was introduced to the local curriculum for 11 – 12-year-old children
- Training courses on Agriculture, Tourism, and Land planning which were offered to the local inhabitants by the consortium of four universities within the newly renewed centre of adult education
- Organizing field trips and research studies on palaeontology, architecture, local tourism, and biodiversity carried out by staff and students of the University of Bucharest, University of Petrosani, and University of Architecture.
- Supporting BSc, M.S., and PhD theses in order to further geopark management plan activities</td></tr>
<tr><td>Austria
(Nature Park Eisenwurzen)</td><td>×</td><td>-</td><td>×</td><td></td></tr>
<tr><td colspan="5">- Establishing a Geo-centre and designing an artificial landscape geo-model for children</td></tr>
<tr><td>France (Reserve Geologique de Haute-Provence)</td><td>×</td><td>×</td><td>×</td><td></td></tr>
<tr><td colspan="5">- Creating Georium (interactive tool for school children, ages ranging from 6 to 13 , in the Museum Premonade)</td></tr>
</table>

Table 4.2.9 - Responses to educational activities in geoparks (cont.).

Country/ Geopark name	Educational program for schools and universities	Workshop	publication	Museum
Czech Republic (Bohemian Paradise)	×	×	×	×
- Holding geological workshops managed by locals - Holding workshops for sightless children and students				
Germany (Swabian Alb Geopark)	×	-	×	×
- Providing facilities such as guide tours, interpretative trails, and exhibitions for public awareness and schoolchildren				
Germany (Vulkaneifel Geopark)	×	×	×	×
- Holding workshops for children in minerals, water, and volcanoes - Holding workshops for adults in volcanology, minerals, and fossils - Organizing Willi basalt tour for schoolchildren				
Germany (Geo and Naturepark TERRA.vita)	×	-	×	×
- Introducing Terra.Vita geopark as an open air museum for dinosaur footprints				
Germany (Geopark Harz. Braunschweiger Land Ostfalen)	×	×	×	×
- Establishing Goslaren Museum (the classical geological square mile in the geopark)				
Ireland (Copper Coast Geopark)	×	×	×	×
- Organizing educational programs in primary schools (raising awareness of geology through fieldtrips - Organizing educational programs in secondary schools (geography curriculum related fieldtrips, geographical investigation with measurement of coastal erosion features) - Raising public knowledge through organizing a geology course/diploma, developing local environment studies, and holding craft workshops				
North Ireland (Marble Arch Caves Global Geopark)	×	×	×	×
- Organizing nature activities for kids - Preparing Geo and Eco-trails for students - Holding Earth science education workshops				
Scotland (Lochaber Geopark)	×	-	×	×
- Establishing a tourism information centre				

Table 4.2.9 - Responses to educational activities in geoparks (cont.).

<table>
<tr><th>Country/ Geopark name</th><th>Educational program for schools and universities</th><th>Workshop</th><th>Publication</th><th>Museum</th></tr>
<tr><td>Norway
(Gea Norvegica Geopark)</td><td>×</td><td>-</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Adding geology to the curriculum of secondary schools (Geo1 and Geo2) in March 2007
- Developing some fundamental educational packages for use in primary and secondary schools by Gea Norvegica Geopark</td></tr>
<tr><td>Malaysia (Langkawi Geopark)</td><td>×</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td>Iran (Qeshm Geopark)</td><td>-</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Writing the atlas of Qeshm
- Writing the bird atlas of Qeshm
- Holding a workshop titled “what is a geopark” for local governors, schoolchildren and teachers
- Holding a star party for gathering of amateur astronomers for the purpose of observing the sky</td></tr>
<tr><td>Japan (Itoigawa Geopark)</td><td>×</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Organizing rice plant propagation for Tokyo schoolchildren
- Organizing school excursions
- Holding rock crystal workshops for schoolchildren
- Establishing Fossa Magna Museum</td></tr>
<tr><td>Australia (Kanawinka Geopark)</td><td>×</td><td>×</td><td>×</td><td>×</td></tr>
<tr><td colspan="5">- Establishing a volcano discovery centre situated at the base of Mount Rouse in Penshurst; the Centre gives information about how volcanoes are formed, their geology and their history in Western Victoria,
- Providing a video simulation of Mt Rouse erupting and the interaction of the Koori people with volcanoes
- Organizing an educational program for schoolchildren</td></tr>
<tr><td>Brazil (Araripe Geopark)</td><td>×</td><td>×</td><td colspan="2">×</td></tr>
<tr><td colspan="5">- Establishing a laboratory for school education (Casa Grande Foundation)
- Organizing some workshops on themes such as fossil replicas, xylography, geoparks, geotourism, and regional development
- Establishing a palaeontology Museum in the geopark</td></tr>
</table>

4.2.1.5. Innovation and New Strategies in Geoparks

According to Miller and Washington, 2009; innovation is an important factor in the development of geotourism. Geoparks, as the best paradigm in promoting geotourism, should offer different facilities to visitors which they have never experienced in other tourist destinations. This section attempts to discover policies and new strategies (innovation) pursued by the local government of geoparks in achieving goals of sustainable tourism for locals in rural areas. The following hypothesis was built to investigate innovation in geoparks:

- H6: Geoparks promote geotourism through innovative strategies

Designing a question in the questionnaire (Q = Are there some initiatives in promoting regional food and / or ecological products?) helped us to find out the innovation applied in geoparks.

This section focuses on innovative strategies of geoparks to achieve three targets (education, conservation and geotourism development) in five innovation categories mentioned by Hjalager (2002).

Since management innovation is one of the five categories of innovation and network activity is a form of management and collaboration in recent decades, another questionnaire was distributed to all geoparks registered (N=66) in UNESCO Global Geoparks Network to investigate the relationship between members of GGN and EGN.

This phase was conducted from October to November 2010 and nineteen geopark authorities filled in a form. The Social Network Analysis technique was used, and the network was designed by means of Pajek as a visualisation program.

4.2.1.5.1. Production Innovation

Production innovation consists of new products or services developed to the stage of commercialization. Their novelty should be evident to producers, suppliers, consumers or competitors. Loyalty programs, events based on local traditions, and environmentally sustainable accommodation facilities are examples of production innovation in recent years. The tourism product is a complete experience, encompassing everything from the time a tourist leaves his home to the time he returns back (Weiermair, 2006).

Regarding this definition, traditional festivals, regional fairs, geopark themed competitions (Appendix 35), geo-products, geo-sports, rural accommodation, geo-restaurants, geo-bakeries, georiums, geopark calendars, geopark flags (e.g. Stonehammer geopark flag, Canada), geological gardens, stone forests, print media (publications and books), and educational programs are new products in geoparks.

However, geoparks can participate in socioeconomic and sociocultural developments of their territory and surroundings through collaborating with locally-based small and medium-sized enterprises. Geoparks include new products and services, ranging from interpretative provision to souvenir manufacture and leisure-related activities (geo-sports, like cycling and climbing) (Hose, 2007).

Currently, most of the local productions are linked to the geopark activities to introduce geological elements. Taking as examples: the Geococktail (Vulkaneifel Mineral Water Cocktails) in Vulkaneifel European Geopark (Germany); the dinosaur bread in Hateg Country Dinosaurs European Geopark, (Romania); the ammonite chocolate and the ammonite bread in Réserve Géologique de Haute-Provence European Geopark (France) (Appendix 36); the trilobite cookies (Appendix 37) in Naturtejo European Geopark (Portugal), and the Pedras Parideiras in Arouca European Geopark (Portugal).

These innovative products not only improve the local economy and present the local products but also educate tourists and popularize geological science. For instance, *Pedras Parideiras* cakes existed well before the establishment of the Arouca Geopark. This geopark is very important because of *Pedras Parideiras* rocks. Although it shows the importance of the area, before the establishment of Arouca Geopark, visitors and local people learned almost nothing about this geological heritage besides curiosity about their existence. Therefore it can be said that geo-products must be more communicational and pedagogic tools.

In geoparks, local products and handicrafts should become close to trade marking and should be designed based on geoparks' environmental and cultural elements. These products may be used in decorative or utilitarian ornaments, commemorative goods made of stone or wood, furniture, toys for children, and clothes. Trilobite clocks as a decorative geo-product in Arouca Geopark (Portugal) can be a good example in this regard.

The geo-products would certainly stimulate locals for new economic activities in the region of the parks.
Geo-menus and geo-food such as boulder soup and Orogenic toasts, earth slices (plate tectonic pizzas) served in the geo-restaurant (*Petiscos e Granitos*) and geo-bakery (*Casa do Forno*) of Naturtejo Geopark are also innovative products in geoparks.

Signposts, which refer to geotourism maps, interpretative panels, leaflets, and so on, are other tourism facilities (products) which geoparks offer to their visitors.
The establishment of a geological garden is another innovation in some geoparks such as Copper Coast European Geopark. It is noteworthy that botanic gardens offer various kinds

of plant species to visitors, and a geological garden located in the Copper Coast Geopark exhibit various kinds of the rocks in this territory.

As Gray (2008) argued, some sports and leisure activities are based on topography, and are named as geo-sports or geo-leisure activities. Geoparks also supply some recreational facilities such as geo-sports and fun and adventurous activities. In geoparks, most sports, (geo-kayaking, geo-bike cycling tour to discover the geological heritage – geo-hiking, and geo-rafting) are related to earth topography and geology. Regarding geo-recreational activities, the Naturtejo European Geopark (Portugal) has designed a trilobite swimming board (Appendix 38) for tourists who desire to swim in the pool with a long-extinct animal.

All the above mentioned innovative strategies demonstrate that this is the art of geoparks that, through innovation, offers knowledge and recreation to tourists. These innovative strategies in geoparks are key factors in rural development through involving locals in geotourism marketing and geopark activities.

4.2.1.5.2. Process Innovation

Process innovation involves a way of raising the performance of existing operations with new or improved technology or through redesigning the entire production line (Hjalager, 2002). These kinds of innovation can be combined with or result in product innovation. New technologies have resulted in development of new skills, new materials, new services, and new forms of organization. This has been especially true in the last two decades, in which technological innovation has played a crucial role. In tourism, technology has created a new form of business called “e-tourism” which is today the most successful form of “e-commerce”. For instance geoparks use new means of promotion of their products (conferences, events, fairs, workshops, etc.) in social networks such as Facebook. Naturtejo Geopark (Portugal), Arouca Geopark (Portugal), Langkawi Geopark (Malaysia), English Riviera Geopark, Hateg Country Dinosaurs Geopark (Romania) and so on designed a page on Facebook. Through Facebook they invite many members to join their groups and introduce and supply their products to members.

Supplying and selling products through online shops are other new technologies which geoparks such as Papuk Geopark (Croatia), Naturtejo Geopark (Portugal), Arouca Geopark (Portugal), and so on, have applied for promoting their products.

Since the media can play an important role in tourist attractions, the Global Geoparks Network and European Geoparks Network have set up a corporative channel TV (Geopark online TV). Geopark TV was established in 2008 with 6 partners - ADRIMAG - LAG (Portugal), Lesvos Local Development Company S.A. - LAG (Etal S.A.) (Greece), Mercury Mine in Closed Idrija (Slovenia), Natural History Museum of Lesvos' Petrified Forest (Greece) and North Pennines Area of Outstanding Natural Beauty (AONB) (United Kingdom). The main objective of Geopark TV, as an innovation, can be promoting geoparks and geotourism and fostering the establishment of networks and technology innovation. Geopark TV will allow partners to the exhibit natural and cultural heritage of their territories and share their knowledge for a better management of geoparks. Providing the Marble Arch Caves Virtual Tour (UK) is another example of process innovation in geoparks.

Besides this, geoparks provide new and innovative facilities for education and tourist guides. TERRAGAZE mobile (Appendix 39), which was mentioned before, will be a new facility in Naturtejo Geopark (Portugal). Naturtejo Geopark is applying TERRAGAZE mobile as a field guide which is supported by GPS. It is a portable multimedia system directed specifically at geotourism and geoscience education. When the visitor is passing through a geosite, specific information is automatically displayed.

Moreover, Lochaber Geopark (Scotland) is working on mobile phone interpretation material for the geopark.

A text message system is used in Geo and Naturepark TERRA.vita the system is based on short texts and dialogues that are read out to visitors regarding geology, earth history, and culture (Lehmkuhl and Kluttig, 2011).

Using a 4D simulator and a series of facilities (satellites) scattered around Teruel province are other innovative strategies for the popularization of geology in the palaeontological museum of Maestrazgo Geopark, Spain (Alcala, 2011).

In addition to new technologies, geoparks strive to redesign the entire production line as a way to reach sustainable development. It is noteworthy that *Casa de Forno* (geo-refuge) which is located in Naturtejo European Geopark (Portugal) territory was an ancient community oven (Geraldes and Ferreira, 2009). In 2007, *Casa de Forno* was turned in to rural accommodation and a geo-bakery. In this rural accommodation, every room has a name related to local geological or cultural heritage and it has been decorated with geological landscape pictures; furthermore, in the corridors and yard visitors can see a collection of stones and local handicrafts. The manager of the geo-refuge uses information technology systems to manage room availability by an e-booking system.

Also, Bohemian Paradise European Geopark (Czech Republic) has provided traditional transportation (steam locomotive) to facilitate travelling throughout the geopark territory.

Consequently, the above mentioned activities illustrate that geoparks, through producing geo-products, applying new technology and redesigning the entire production line, find ways to introduce geoparks as new tourism destinations by reinforcing images of the past (traditional culture, geological processes, and so on).

4.2.1.5.3. Management Innovation

New job profiles, collaborative structures, and authority systems belong to this category of management innovation, often in combination with introduction of new products, services, and production technologies. “Innovation requires entrepreneurship through which somebody struggles to realize the idea as a business idea”. Entrepreneurs are often described as people who ‘do something new’ and thus create new value (Wickham, 2004) and growth (Ioannides and Petersen, 2003).

Results of research indicate that developing geotourism in geoparks can generate new job opportunities, new economic activities, and additional sources of income, especially in rural regions. Moreover, a geopark stimulates local socioeconomic activities by attracting an increasing numbers of visitors. It encourages production of local products and local handicrafts involved in geotourism and geo-marketing such as geo-products.

Establishing geo-restaurants, geo-bakeries, family guest houses and rural accommodation, organizing geological education programs (for children including schoolchildren) and geotours, holding workshops, regional fairs, and festivals, involving locals in conservation activities, engaging locals in surveillance of geosites or leadership in geopark museums are new job opportunities which directly emerge through geotourism and geopark activities.

Aside from new job profiles, management innovation gives emphasis to collaborative structures such as network activity.

It is worth mentioning that geoparks are established at an international level but managed at a local level and network activities (Figure 4.2.6) play an important role in geopark management. All experts believe that the most promising vehicles for innovation are cooperation, alliances, and/or networking in various fields such as technology, marketing, distribution, and human resource sharing.

Creating a national or local network or forum is the best way that some geoparks have applied to reach their goals (education, conservation, and geotourism).

Besides the UNESCO Global Geoparks Network, Asia-Pacific Geoparks Network, and European Geoparks Network activities, some countries such as Japan, France, Germany and China have developed the National Geoparks Network and new National Geoparks Fora. These networks are appearing to create close collaboration between geoparks, tourism sectors, schools, universities, and businesses. Thus, the national network and fora not only provide an opportunity for exchange of knowledge but also encourage locals and private sectors to participate in geopark activities.

Themed networks among European Geoparks, such as the Volcanic Group, the Fossils Group or the Coastal Group are scientific networks and have a vital role for better management of geoparks and exchange of knowledge.

Consequently, geoparks through geotourism – "as a niche marketing (special interest groups) with geological interest" – encourage innovative firms to achieve economies of scope, innovating on the basis of cooperative alliances and other forms of networking.

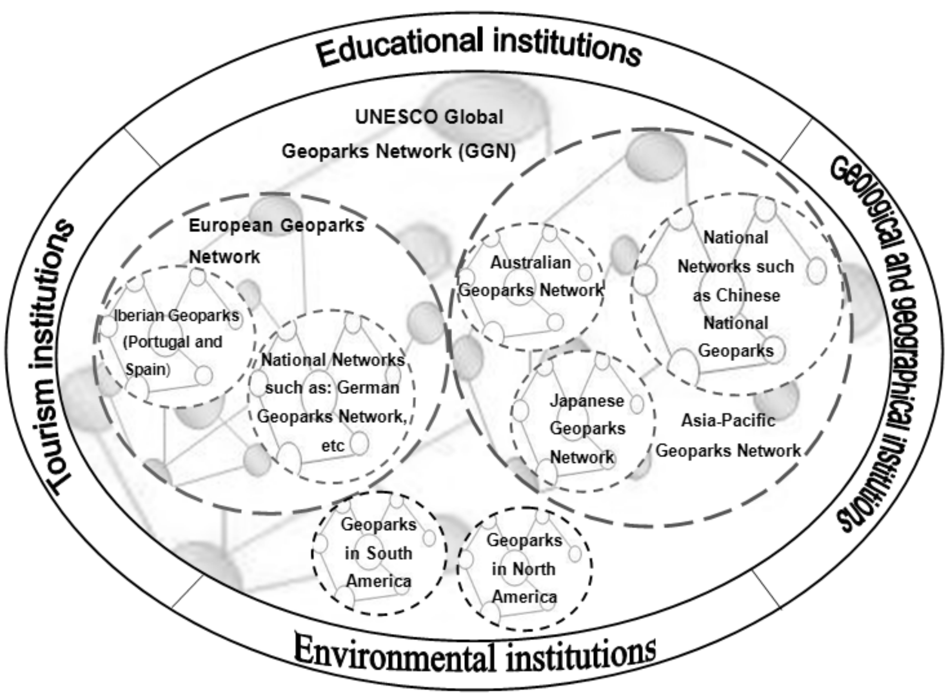


Figure 4.2.6 - Dynamic model in geoparks, (Source: own construction)

4.2.1.5.3.1. Network Analysis in UNESCO Global Geoparks Network

According to some authors (Lowe *et al.*, 1995; Day, 1998; Murdoch, 2000; Sobels *et a*l. 2001; Agência Desenvolvimento Turístico, 2008; Lee *et al*., 2005; Chris *et al*., 2005; Hall, 2005; Romeiro and Costa, 2010) network activity can help to maximize the sustainability of employment, stimulate processes of social innovation and provide an opportunity for exchange of knowledge.

Since network activities are a management innovation in geoparks and the European Geopark Network and the UNESCO Global Geoparks Network introduced the network concept to geo-sciences and geotourism, this part of the study tries to discover the areas of collaboration between geoparks by comparing nineteen different geoparks as geotourism destinations in Europe, Asia, and Australia.

Regarding this, an e-survey as a new category of questionnaire-based surveys (mail) was used. Besides the e-survey, a social network analysis technique was applied, and the networks were designed by means of Pajek as a network analysis tool and a visualisation program. An electronic questionnaire was designed for sending to authorities of geoparks around the world and data was gathered from October to December 2010. Questions 1 and 2 - With which geoparks does your geopark collaborate? And in which area? – investigated the collaboration between geoparks in the areas of: tourism marketing; educational activities; conservation programs; production of new products; exchange of knowledge; conferences; meetings, and others.

Bear in mind that the number of geoparks registered in GGN was 66 until October 2010. According to the 9th European Geoparks Network conference in Lesvos Island (Greece) the number of geoparks increased to 77 in 24 countries.

Since data for this part of study was collected over three months (from October to December 2010), it is obvious that the former geoparks had no collaboration with the 11 new geoparks for these 3 months. Thus we exclude the new geoparks (n=11) from the population (N=77), including, however, an aspiring geopark (Hong Kong) located in China. This exception is justified due to the existing collaboration between this geopark and Itoigawa Geopark in Japan, and Yandangshan Geopark in China. Therefore, we end up with 67 geoparks (Figure 4.2.7). Nineteen questionnaire responses were received (28%). The majority of responses were collected in Europe (68%), and the others were from China, Australia, Iran, Malaysia, and Japan (Table 4.2.11, Figure 4.2.7).

Our network illustrates that the number of links are 501 and nodes (geoparks) are 67. The number of disconnected nodes is 13 (Table 4.2.10 and 4.2.11).

For N number of nodes, Maximum Connectivity of the Network (MCN), Network Connection Rate (CN), and the number of connections (IC) are obtained by:

MCN= $C_2^N = \frac{N!}{2!(N-2)!}$ (1)

CN= $\frac{\sum ni}{C_2^N}$ (2)

IC= $\frac{n1}{N-1}$ (3)

Where, ni and n1 denote the number of links and the existing nodes respectively. Based on the obtained measurements of network analysis (Network Connection Rate (CN = 0.2) and Maximum Connectivity of the Network (MCN = 2211)); network activity in the GGN is weak, and the Global Geoparks Network should try to expand network activities between geoparks, especially those located in Asia and Asia-Pacific (Figure 4.2.7).

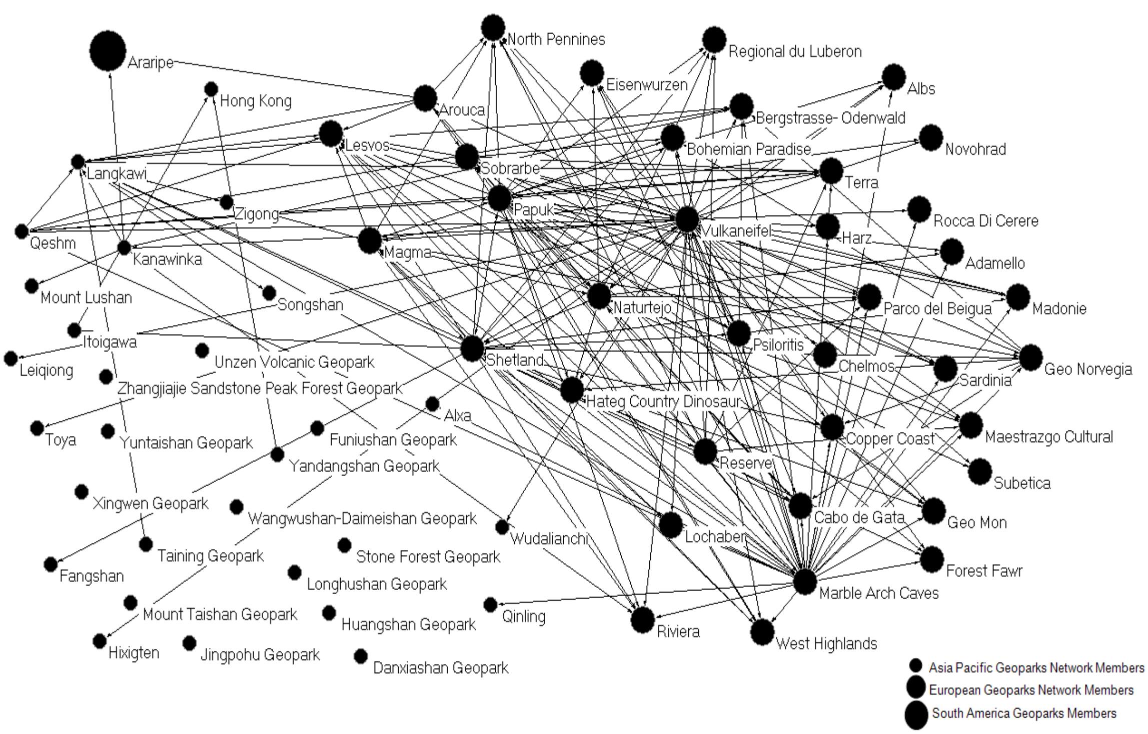


Figure 4.2.7 - Network related to collaboration between UNESCO Global Geoparks Network members

Table 4.2.10 - Main characteristics of network analysis of the UNESCO Global Geoparks Network

Number of Nodes	**67**
Disconnected Nodes	13
Number of edges	-
Density1 [loops allowed]	0.0449989
Density2 [no loops allowed]	0.0456807
Average Degree	6.0298507

Table 4.2.11 - Network indicators for UNESCO Global Geoparks Network members who replied to the questionnaire

NO	**Geopark**	**IC=** $\frac{n1}{N-1}$ **N=67**	**Links**
1	Marble Arch Caves Global Geopark	0.51	103
2	Vulkaneifel Geopark	0.6	85
3	Swabian Alb Geopark	0.47	69
4	Geopark Shetland	0.33	36
5	Papuk Geopark	0.33	32
6	Naturtejo Geopark	0.2	25
7	Réserve Géologique de Haute-Provence	0.15	23
8	Psiloritis Natural Park	0.09	22
9	Magma Geopark	0.18	21
10	Arouca Geopark	0.11	17
11	Kanawinka Geopark	0.09	14
12	Gea Norvegica Geopark	0.09	11
13	Sobrarbe Geopark	0.17	11
14	Qeshm Geopark	0.09	6
15	Leiqiong Geopark	0.03	6
16	Yandangshan Geopark	0.03	6
17	Langkawi Geopark	0.09	5
18	Hateg Country Dinosaurs Geopark	0.04	5
19	Itoigawa	0.03	4
Total		0.81	501

All of the geoparks participate in activities such as holding GGN conferences, and/or EGN conferences every year. In addition, all of the geoparks are involved in writing chapters for books related to geoparks and geotourism activities.

Our results also investigated the areas of collaboration between geoparks (Table 4.2.12). Further analysis demonstrates that among geoparks, Marble Arch Caves Global Geopark (UK) with 103 links (Table 4.2.11) is the leading geopark in network activity. As well as collaboration in the areas of tourism marketing, educational activities, conservation programs, the production of new products, exchange of knowledge, conferences, and meetings, Marble Arch Caves Global Geopark joined EU projects with Nature Park Terra Vita (Germany), Vulkaneifel Geopark (Germany) and Geopark Bergstrasse-Odenwald (Germany). Moreover, Marble Arch Caves Global Geopark has collaboration with Langkawi Geopark (Malaysia) in the field of exchange of knowledge in schools. Furthermore, Marble Arch Caves Global Geopark works with aspiring geoparks and gives them advice and information. This Geopark has acted as host for future geoparks; for instance, some new or proposed geoparks such as Hong Kong, Taiwan, Canada and Ireland visited this geopark in order to gain experience and information. This geopark is a member in advisory missions and gives practical advice to aspiring geoparks.

Vulkaneifel Geopark (Germany) with 85 links is the second most active geopark in the network. Vulkaneifel Geopark (Germany) has collaboration with 42 geoparks, and the majority of collaborations are in the fields of meetings and tourism marketing (Table 4.2.12). Creating a print media for cross-marketing of participating geoparks by Vulkaneifel Geopark and geoparks of Ireland and Britain is the first collaborative activity. Providing a brochure for the target group of teachers containing information on Vulkaneifel Geopark together with other geoparks aiming to recommend those as destinations for school trips, is another collaborative activity in this geopark. The production of common material and common presentation for fairs, and participation with European geoparks in writing a common coffee table book are enterprises of Vulkaneifel Geopark in Network activities.

Aside from meetings and tourism marketing, Vulkaneifel Geopark (Germany) is in cooperation with Papuk Geopark (Croatia), Petrified Forest of Lesvos Geopark (Greece), Hateg Country Dinosaurs Geopark (Romania), and Cabo de Gata Natural Park (Spain) in the field of the production of new products.

Swabian Alb Geopark (Germany) with 69 links is the third most active geopark in the network. The majority of its activities are focused on conferences and meetings. Geopark Shetland (UK) with 36 links is the fourth most active geopark in the network.

It is important to distinguish two kinds of clusters in geoparks: thematic clusters and geographic clusters. A.P.G.G.N and EGN, which are under the umbrella of GGN, are examples of geographic clusters. Moreover, there are seven thematic clusters in European Geoparks such as: Volcanic, Karstic, Fossils, Glacial, Mining, Coastal, and Tectonic cluster. For instance, the volcanic thematic network includes Geopark Shetland, Papuk Geopark, Bohemian Paradise, Vulkaneifel Geopark, the Petrified Forest of Lesvos, Cabo de Gata Natural Park, and Lochaber Geopark; the Coastal thematic network includes Geopark Shetland, the Petrified Forest of Lesvos, Gea-Norvegica Geopark, Copper Coast Geopark, Geo Mon Geopark, and English Riviera Geopark. These are cases in point of thematic clusters.

According to Table 4.2.12, the majority of collaboration in GGN is concentrated in the fields of meetings (Link=132), exchange of knowledge and conferences (both include 80 links). Consequently, it can be said that at present, exchange of knowledge is an important target in GGN activity. Moreover, development of tourism marketing (Links=65) is the fourth target of Network activities in GGN.

Table 4.2.12 - Numbers of links in each field of collaboration for geoparks which replied to the questionnaire

Geoparks	Field of Collaboration								
	□	◊	∇	●	♦	⁎	⊗	⊕	×	∆
Réserve Géologique de Haute-Provence	3	5	-	1	2	3	3	-	-	6
Naturtejo Geopark	6	3	-	7	2	2	4	-	-	1
Arouca Geopark	-	3	-	-	4	4	5	-	-	1
Vulkaneifel Geopark	39	-	-	4	2	1	36	-	-	3
Swabian Alb Geopark	-	-	-	-	2	29	29	-	-	9
Psiloritis Natural Park	-	3	-	2	4	5	5	-	-	3
Sobrarbe Geopark	-	-	-	-	1	4	6	-	-	-
Magma Geopark	-	2	-	-	6	7	3	-	-	3
Gea Norvegica Geopark	-	-	-	-	4	2	3	-	-	2
Marble Arch Caves Global Geopark	7	9	6	7	31	12	18	-	-	13
Geopark Shetland	5	2	-	-	4	4	6	6	6	3
Hateg Country Dinosaurs Geopark	1	1	-	-	1	-	-	-	-	2
Papuk Geopark	1	9	3	-	9	-	7	-	-	3
Kanawinka Geopark	1	1	1	-	5	2	4	-	-	-
Qeshm Geopark	-	1	1	-	1	-	-	-	-	3
Langkawi Geopark	-	-	-	-	-	2	-	-	-	3
Itoigawa Geopark	-	1	-	-	1	1	1	-	-	-
Yandangshan Geopark	1	1	1	-	1	1	1	-	-	-
Leiqiong Geopark	1	1	1	1	-	1	1	-	-	-
Total Numbers of links	65	42	13	22	80	80	132	6	6	55

Key of Table	
□ Tourism Marketing	⁎ Conferences
◊ Educational Activities	⊗ Meetings
∇ Conservation Programs	⊕ Volcanic thematic Network
● Production of New Products	× Coastal thematic Network
♦ Exchange of Knowledge	∆ Others

4.2.1.5.3.2. Network Analysis in the European Geoparks Network

This section focuses on network analysis in European Geoparks by using the above-mentioned formulas and Pajek program tools.

According to the 9th European Geoparks Network conference in Lesvos Island, Greece, the number of European Geoparks increased to 42.

Data for this part of study was gathered from October 2010 to December 2010. The former geoparks which had no collaboration with the 5 new European geoparks (n=5) for these 3 months were excluded from the population (N=42). Therefore, we end up with 37 European Geoparks (Figure 4.2.8). Thirteen questionnaire responses were received (35%) (Table 4.2.13).

Table 4.2.13 - Network indicators for European Geoparks Network members which replied to the questionnaire

NO.	Geopark	IC= $\frac{n1}{N-1}$ N=37	Link
1	Marble Arch Caves Global Geopark	0.83	97
2	Vulkaneifel Geopark	0.91	75
3	Swabian Alb Geopark	0.86	69
4	Geopark Shetland	0.53	33
5	Papuk Geopark	0.61	31
6	Naturtejo Geopark	0.36	25
7	Réserve Géologique de Haute-Provence	0.25	22
8	Psiloritis Natural Park	0.17	22
9	Magma Geopark	0.3	20
10	Arouca Geopark	0.14	13
11	Gea Norvegica Geopark	0.17	11
12	Sobrarbe Geopark	0.3	11
13	Hateg Country Dinosaurs Geopark	0.08	5
	Total	1.02	434

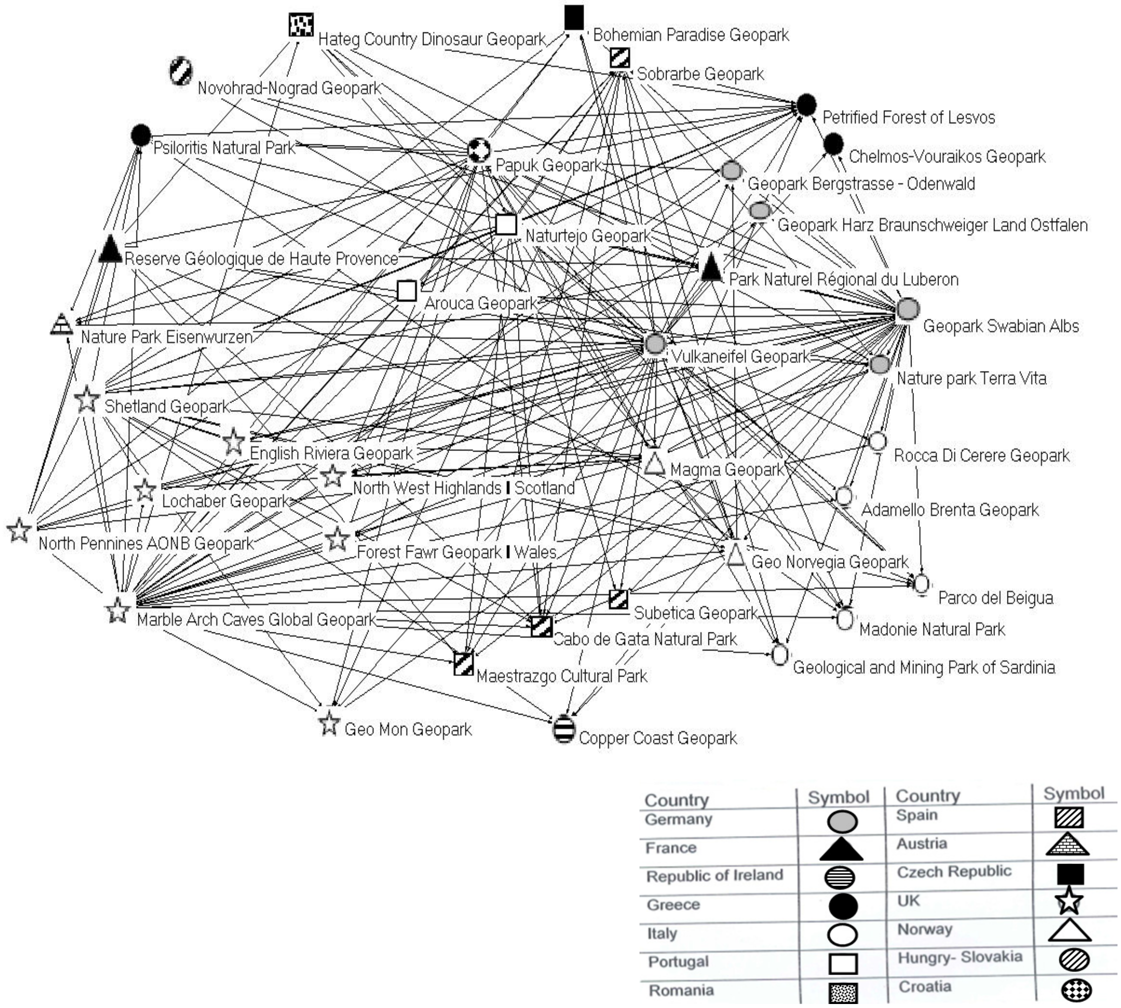


Figure 4.2.8 - Network related to collaboration between European Geoparks Network members

Based on the results of the formula related to Network analysis (Network Connection Rate (CN= 0.65) and Maximum Connectivity of the Network (MCN= 666)), Network activity in EGN is stronger than in the GGN. There are no disconnected nodes in the EGN, and all of the nodes are involved in network activities (Figure 4.2.8, Table 4.2.14).

Table 4.2.14 - Main characteristics of network analysis of the European Geoparks Network

Number of Nodes	**37**
Disconnected Nodes	0
Number of edges	-
Density1 [loops allowed]	0.1468225
Density2 [no loops allowed]	0.1509009
Average Degree	10.8648649

On the basis of the results, it can be concluded that the EGN has concentrated its network activity on the fields of meetings (links=122), conferences (links=68), and exchange of knowledge (links=65). In addition, the development of tourism marketing (links=56) is the fourth target of the establishment of the EGN (Table 4.2.15).

Among the European Geoparks, Vulkaneifel Geopark (links= 35), Marble Arch Caves Global Geopark (Links= 7), and Naturtejo Geopark (Links= 6) are more active than the other geoparks in the field of tourism marketing (Table 4.2.15).

Production of new products is an innovation in geoparks and the results of Table 4.2.15 indicate that Naturtejo Geopark (Links=7) and Marble Arch Caves Global Geopark (Links=7) are pioneers in collaboration in the field of the production of new products.

There are 44 links regarding other kinds of collaboration. According to the questionnaires filled in by respondents, these links refer to activities such as organizing European projects, writing book chapters, organizing common presentations, holding common fairs and exhibitions, organizing field trips, and cultural projects. Figure 4.2.9 indicates that the collaboration degree pattern of members in GGN is similar to EGN members and the majority of network activities are devoted to EGN members.

Table 4.2.15-Numbers of links in each field of collaboration for the European geoparks which replied to the questionnaire

Geoparks	Field of Collaboration									
	□	◊	∇	●	♦	∗	⊗	⊕	×	∆
Réserve Géologique de Haute-Provence	3	5	-	1	2	3	3	-	-	5
Naturtejo Geopark	6	3	-	7	2	2	4	-	-	1
Arouca Geopark	-	3	-	-	3	2	4	-	-	1
Vulkaneifel Geopark	35	-	-	4	1	-	35	-	-	-
Swabian Alb Geopark	-	-	-	-	2	29	29	-	-	9
Psiloritis Natural Park	-	3	-	2	4	5	5	-	-	3
Sobrarbe Geopark	-	-	-	-	1	4	6	-	-	-
Magma Geopark	-	2	-	-	6	6	3	-	-	3
Gea Norvegica Geopark	-	-	-	-	4	2	3	-	-	2
Marble Arch Caves Global Geopark	7	9	6	7	27	12	17	-	-	12
Geopark Shetland	3	2	-	-	4	3	6	6	6	3
Hateg Country Dinosaurs Geopark	1	1	-	-	1	-	-	-	-	2
Papuk Geopark	1	9	3	-	8	-	7	-	-	3
Total Numbers of links	56	37	9	21	65	68	122	6	6	44

Key of Table	
□ Tourism Marketing	∗ Conferences
◊ Educational Activities	⊗ Meetings
∇ Conservation Programs	⊕ Volcanic thematic Network
● Production of New Products	× Coastal thematic Network
♦ Exchange of Knowledge	∆ Others

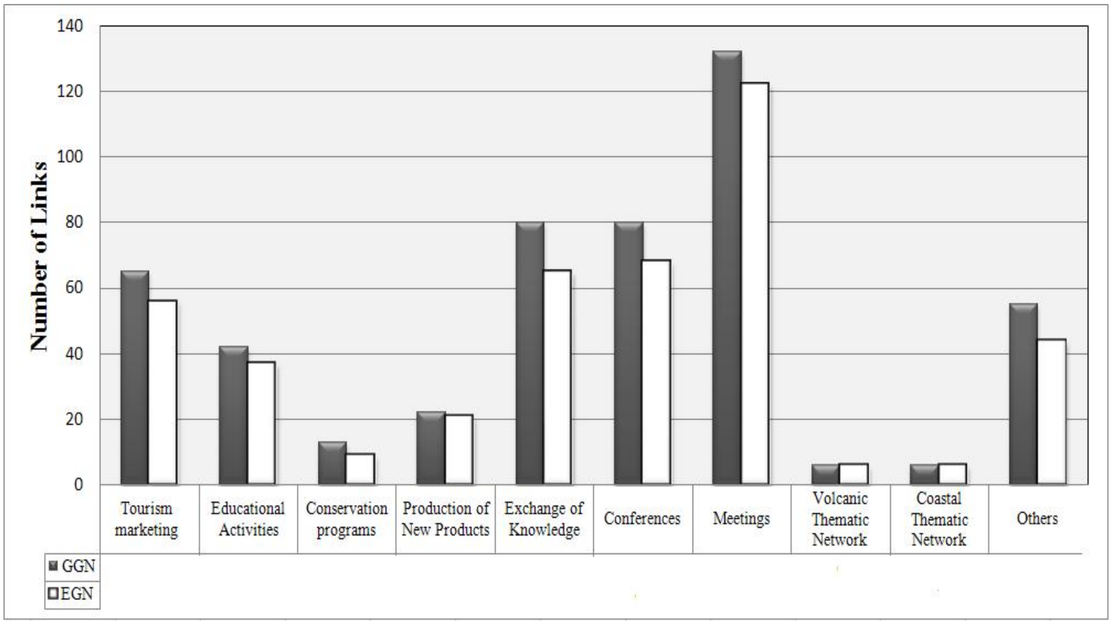


Figure 4.2.9- Number of links versus collaboration areas in GGN and EGN

Consequently, the above results can confirm the tenth and the eleventh hypotheses (H10: Network activity in EGN is stronger than in the GGN and H11: The majority of collaboration in GGN and EGN is concentrated in the field of exchange of knowledge and Knowledge transfer).

4.2.1.5.4. Logistics Innovation

The development of internet marketing is classified as logistics innovation (Hjalager, 2002). In most geoparks rural accommodations are equipped with an e-booking system; in addition, some geoparks supply their products to visitors through online shopping and virtual tours on their web sites.

For instance Kents Cavern is a famous and important Quaternary geosite in English Riviera Geopark (UK). This site is significant for studies in palaeontology. It is possible for visitors to buy the ticket and find out more information easily online.

4.2.1.5.5. Institutional Innovation

Institutional innovation deals with collaborative and regulatory structures in communities in which public and private sectors cooperate together with new rules and regulations (Hjalager, 2002).

Geoparks stimulate development of the local economy through involving local communities and local private sectors in geopark activities. As a result, geopark takes advantage of local knowledge for a better management of geoparks.

Local communities and local business people benefit from the common logo of the geopark, local environmental/marketing certification, and innovative ideas of geopark authorities. For instance, officials of Naturtejo European Geopark (Portugal) play a vital role in consulting with locals and suggesting innovative ideas to them with the goal of improvement of the economy in geopark territory. Naturtejo Geopark cooperates with private sectors such as health centres of natural spa, foreign and domestic active tourism companies, NGOs, hotels, restaurants, and rural hostels.

In addition, Psiloritis Geopark (Greece) runs a project titled “*Land of Psiloritis*”; it is carried out in cooperation with local stakeholders (taverns, accommodation places, agritouristic enterprises etc.) who apply the logo of geopark as the brand name for a network of cooperating enterprises. Members have to fulfil certain quality standards that have been set in collaboration with the geopark and are evaluated every year by a common group of specialists.

The Eifel region (Vulkaneifel Geopark) is a natural area with unique character, known for it’s an attractive landscape and as a region of origin as high-quality products with the new regional brand “e” which can be directly recognized by consumers as the special quality of the Eifel. It is symbolized with a brand logo with a yellow “e”; this brand is a multipurpose brand and is used for agriculture, forestry, trade, tourism activities, and local products.

It is evident from the five innovation categories that learning from the past can be a way for building a sustainable future in geopark territories.

It is obvious that geoparks require innovation in order to achieve sustainable development. Moreover, creative ideas in geoparks could lead to improved quality, development of new computational paradigms, extension of some current frameworks, local socioeconomic development, local sociocultural development, environmental impact, etc.

It was already clear in 1992[1] that innovation and change for the creation of a sustainable society cannot be achieved without active involvement at the local community level (Velasquez *et al.*, 2005). There is widespread acceptance that sustainable development requires participation of the community in practice as well as in principle. This is reflected in the text of Agenda 21, where the importance of local community action is mentioned in almost all 40 chapters (Velasquez *et al*., 2005). Geotourism as an important marketing strategy in geoparks requires innovation and it should not be viewed as an ordinary business: some of the necessary innovations involve reforming internal management approaches to achieve constructive alterations: some concern new technologies; others are related to the nature of monitoring, regulation, and enforcement processes through globally agreed standards and reporting mechanisms. Central to all these necessary changes is the participation of stakeholders, especially local artists and local communities. Meanwhile, Schiller (2002) indicates that many clients in tourism marketing want to interact with the local culture and wildlife of a destination.

Thus, innovation and participation of local communities are two key components in geopark management planning and geopark activities (Figure 4.2.10).

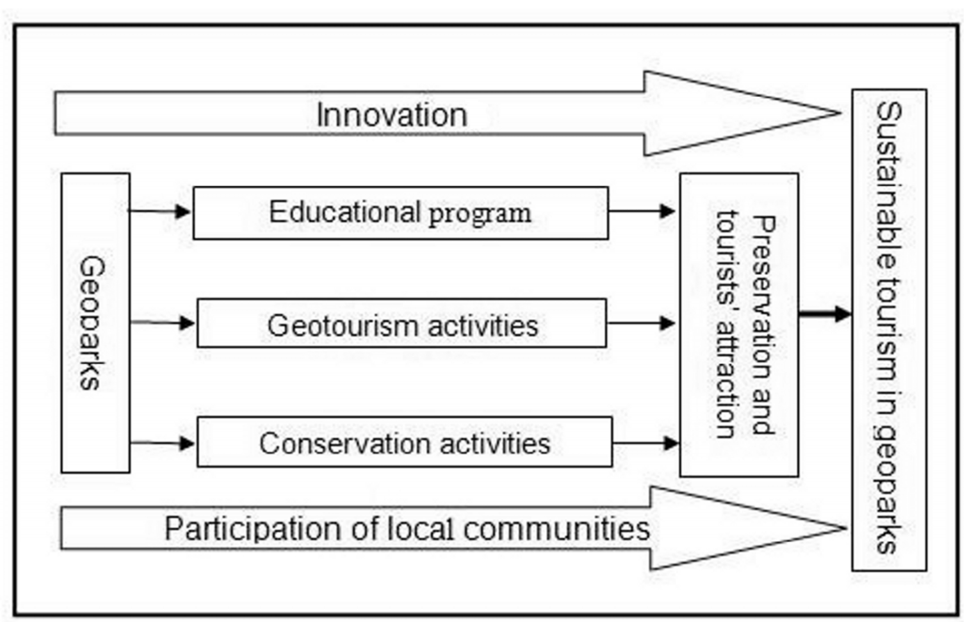


Figure 4.2.10 - Targets of geoparks, (Farsani *et al*., 2012a)

[1] Agenda 21 is a comprehensive plan of action for a sustainable future that was developed at the 1992 Rio Earth Summit.

Accordingly, geoparks as new tourism destinations, through promoting geotourism and applying initiatives, find ways to popularize geological sciences, revive traditional culture, and promote local development. We have summarized the innovation of geoparks adapted from Hjalager's (2002) definition in the following Table (4.2.16).

Table 4.2.16- Innovation in geoparks adapted from Hjalager's (2002) definition (Source: Farsani *et al*., 2012a)

sub-division of innovation Hjalager (2002)	sub-division of innovation in geoparks
Product innovation *consists of new products or services, developed to the stage of commercialization*.	**Production innovation in Geoparks** - Holding traditional festivals and regional fairs - Providing geo-products – local products which are related to geopark activities or are the interpreted symbol of geological heritage of the geopark - Organizing geo-sports – sports which are related to Earth topography: geo-rafting, geo-biking, climbing etc., as examples - Establishing rural accommodation, geo-restaurants and geo-bakeries, providing georiums and geopark calendars. - Establishing geological gardens and stone forests, preparing print media (publications and books) - Organizing educational programs - Creating services and facilities for the development of accessible tourism; establishing a spa therapy centre in geoparks such as Geo and Naturepark TERRA.vita, Swabian Alb Geopark (Germany), etc; preparing a Braille book of Naturtejo Geopark (Portugal) for blind children and holding a workshop for sightless children and students in Bohemian Paradise (Czech Republic) can be starting steps for development of new services and production for accessible tourism market in these territories.
Process innovation *involves a way of raising the performance of existing operations with new or improved technology or through redesigning of the entire production line.*	**Process innovation in Geoparks** - Promoting of their products (conferences, events, fairs, workshops, etc.) in social networks such as Facebook. - Establishing Geopark online TV - Establishing online shops - Providing virtual tours (Marble Arch Caves Virtual Tour as an example) - Preparing TERRAGAZE mobile as an electronic self-geotour guide - Using sustainable energy to reduce air pollution (Naturepark TERRA.vita (Germany) used E-bikes equipped with electric motor to ease biking in hilly areas, the recharging stations are equipped with a solar panel to provide carbon free energy for the bike batteries)

Table 4.2.16- Innovation in geoparks adapted from Hjalager's (2002) definition, (cont.)
(Source: Farsani et al., 2012a)

sub-division of innovation Hjalager (2002)	sub-division of innovation in geoparks
Management Innovation *involves new job profiles, collaborative structures, and authority systems.*	**Management innovation in Geoparks** - Establishing geo-restaurants, geo-bakeries, family guest houses and rural accommodation - Organizing geological education programs (for schoolchildren and kids) - Establishing geotours - Involving the local communities in workshops and regional fairs - Involving locals in conservation activities - Engaging locals in surveillance of geosites or leadership in geopark museums - Developing network activities in rural areas and among geoparks - Developing thematic clusters - Developing twinning agreements or sister partnerships between geoparks
Logistics innovation *involves internet marketing development*	**Logistic innovation in Geoparks** - Equipping rural accommodation with e-booking systems - Supplying their products via online shops or virtual tours
Institutional innovation *deals with collaborative and regulatory structures in communities in which public and private sectors cooperate together with new rules and regulations*	**Institutional innovation in Geoparks** - Establishing the European Geoparks Network and Global Geoparks Network - Establishing the National Geoparks Network in some countries such as China and Japan - Establishing a local Network of partners in each geopark (Réserve Géologique de Haute-Provence Geopark Network – France – taken as an example) - Involving the locals and Small and Medium-Sized Enterprises (SMEs) in geopark activities (local business people benefit from the common geopark logo, local environmental marketing certification, and innovative ideas from the geopark authorities)

4.2.1.5.6. Results of Questionnaires concerning Innovative Strategies in Geoparks

Results of responses clearly indicate that geopark authorities are concerned with applying local arts and innovative strategies to improve local economy and attract more tourists to their territory. Table 4.2.17 summarizes various innovative strategies which are being applied in 25 geoparks around the world and also achieved from the proceedings, newsletters, websites, and monthly reports of geoparks.

Table 4.2.17 - Innovative strategies for the development of geotourism in geoparks
(Source: Farsani *et al.*, 2012a)

Country/ Geopark name	Innovation
Greece (Psiloritis Natural Park)	- Creating geo-products such as decorative or utilitarian ornaments, commemorative goods from stone or wood, furniture, children's toys, and clothes which are symbols of the geopark - Holding open-air painting festivals
Spain (Sobrarbe Geopark)	- Providing three new facilities for educating tourists, students, and researchers, such as Space of the Sobrarbe Geopark, Technical Office, and Geovision Room - Promoting sports related to topography such as mountain biking
Portugal (Naturtejo Geopark)	- Designing a geopark calendar - Creating a geo-bakery and geo-restaurant - Establishing family guest houses - Making a geo-menu and geo-products in *Casa do Forno* (a part of business around the brand of Geo) - providing TERRAGAZE mobile (a field guide of the geopark in your pocket) - Establishing a spa therapy centre - Holding regional and national festivals such as traditional soup, cheeses, olive oil, pottery, bread, wine, chestnut and green beans - Promoting sports related to geology such as geo-kayaking - Designing postcards: GEO-collection - Running a national programme for trekking and running - Using new ways of promotion such as Naturtejo Geopark in Facebook - Celebrating the international mountain day

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Portugal (Naturtejo Geopark)	- Preparing a Braille book of Naturtejo Geopark for blind children - Presenting Naturtejo Geopark activities in BTL –The International Tourism Exhibition - Publishing the last edition of the book from Pam Grout and introducing Naturtejo Geopark among the 100 best volunteer vacations by National Geographic - Holding a dinosaur exposition in 2010 - Designing a dinosaur train during the dinosaur exposition for students - Registering in the Committee of International Year of Biodiversity (2010) - Cleaning the Geopark (on 20th March the day of “Clean Portugal”) - Planting *autochthonous* trees, on the World Forest Day - Organizing United Nations Environmental Program in Naturtejo Geopark (Music & Environment festival) - Establishing olive oil, mountain, water and gold routes - Establishing a shop of the earth (Loja da Terra) to supply local products - Providing facilities for bird watching at Idanha-a-Nova - Organizing a geo-art competition for local artists - Holding a Spring Festival in Idanha-a-Nova schools - Organizing holy walking in the geopark during Easter - Organizing a Symposium on Historical Mining and Metallurgy and preparing a guide for geo and mine sites - Organizing Paintball Tournament Field - Organizing a fair of local products during Oleiros gastronomy week - Holding a watermelon festival - Holding workshops on fossil casts

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al.*, 2012a)

Country/ Geopark name	Innovation
Portugal (Naturtejo Geopark)	- Celebrating the international year of the forests - Holding a festival of local wines and handmade liquors - Establishing the Portuguese Forum of Geoparks - Organizing summer course " Portugal Language and Culture" for international students such as American students - Organizing a fair around the new earth products (e.g. presenting *súbito* wine and olive oil under the brand of Naturtejo Geopark) - Organizing a workshop for making a gold or silver trilobite as a wonderful souvenir - Holding dolomites exhibition in Italy (Longarone) - Creating Geo-sweets - Organizing a Geo-school conference for teachers
Portugal (Arouca Geopark)	- Promoting sports related to geology such as geo-kayaking, geo-rafting, and climbing - Encouraging local schoolchildren to dress up like trilobites, raft boats, and Arouca geopark custom in carnivals - Preparing a geo-dessert book (a book with some ornamental desserts in geological elements) - Establishing a private fossil museum - Creating decorative geo-products such as trilobite clocks, trilobite lamp covers, and trilobite glasses - Introducing Arouca Geopark on channel 2 of Geopark TV online - Presenting Arouca Geopark activities in BTL –The International Tourism Exhibition - Using new ways of promotion such as Arouca Geopark on Facebook - Using the brand of Arouca Geopark on sugar bags for promotion of the geopark

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Portugal (Arouca Geopark)	- Establishing rural hotels - Establishing the Portuguese Forum of Geoparks - Holding a bread festival - Organizing a geo-art competition for local artists
Italy (Geological, Mining Park of Sardinia)	- Holding cultural festivals such as peasant marriage rituals, traditional costumes, and the rituals of holy week - Serving regional food (with local music) during fairs and cultural events - Exhibiting unique industrial archaeological sites such as old power plants, old mining head office, old coal loading ships, an old railway station, and old extraction pits
Italy (Parco Naturale Adamello Brenta)	- Providing logo as a local environmental/marketing certification which is used local development - Providing a ski lift facility for geotourists
Croatia (Papuk Geopark)	- Making souvenirs based on natural and geological heritage of the geopark such as: postcards, Papuk Park logo tag-lines or chains, Papuk logo magnets/badges, Papuk logo badges, Papuk Park T-shirts, candlesticks, mugs - Papuk Nature Park, ceramic bowls, bat badges, and footprints of the "Pannonian Sea" fossil - Promoting sports related to earth topography and nature such as: hiking for health, mountain biking, paragliding, sport climbing, horseback riding, and visiting the caverns. - Establishing an educational centre and a visitor centre which are placed in permanent exhibitions. - Holding traditional tournaments such as a Medieval Knight Tournament
Romania (Hateg Country Dinosaurs Geopark)	- Publishing books about local cuisine - Establishing a small centre for promoting local products, handicrafts, and souvenirs

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al.*, 2012a)

Country/ Geopark name	Innovation
Romania (Hateg Country Dinosaurs Geopark)	- Creating geo-products such as dinosaur bread, etc. - Holding meetings for geopark officials and local producers - Using new ways of promotion such as Hateg Country Dinosaurs geopark on Facebook
Austria (Nature Park Eisenwurzen)	- Organizing medicinal herb tours - Holding courses on aromatherapy - Offering various herbal teas, herbal salts from wild herbs, flowers, salts, floral, and herbal skin care products - Preparing stone pine schnapps - Establishing family guest houses - Promoting geo-rafting - Organizing geotourism markets and producers of common marketing under the *Geo Line* brand (geopark brand) - Providing an artificial landscape model with mountains and rivers for children
France (Réserve Géologique de Haute-Provence)	- Protecting geological heritage through in-situ and ex-situ conservation model - Establishing the Georium (interactive tool for school children ages from 6 to 13, in the Museum Promenade) - Linking craft businesses to the Reserve and making products based on the geological elements (bakeries, pastries, ammonite chocolate, carvers, and ceramic makers) - Renting self-guided GPS tour cars (geo-guide) and self-guided cultural tours on foot
Czech Republic (Bohemian Paradise)	- Holding the traditional September festival - Building the aquacentre (a swimming pool for diving, with a 96 m long toboggan, for both adults and children) - Establishing a spa therapy centre

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Czech Republic (Bohemian Paradise)	- Travelling by a small mining train through a mine shaft, 260 meters long - Providing traditional transportation (steam locomotives) - Organizing a geology exhibition for sightless people
Germany (Swabian Alb Geopark)	- Promoting sports related to geology such as geo-hiking and geo-cycling - Promoting geo-therapy such as mud therapy, hydrotherapy, spa therapy, peat therapy, ice therapy, and paraffin wax therapy
Germany (Vulkaneifel Geopark)	- Creating geo-cocktails such as Vulkaneifel Mineral Water cocktails - Promoting hiking for health
Germany (Geo and Naturepark TERRA.vita)	- Promoting hiking for health - Establishing a spa therapy centre - Using sustainable energy for tourism facilities such as e-bikes
Germany (Geopark Harz . Braunschweiger Land Ostfalen)	- Holding glass blowing workshops
Ireland (Copper Coast European Geopark)	- Designing a geopark calendar - Establishing the geological garden (the geological garden presents large samples of all the rocks forming the foundation of the Copper Coast) - Designing trail cards for Stradbally, Bunmahon, Boatstrand / Dunabrattin, Annestown, Dunhill, and Fenor. - Establishing an artwork centre - Encouraging the Copper Coast women's initiative such as food, beverages, and crafts - Holding Christmas markets and exhibitions - Providing a 19th century mining experience for tourists - Holding a Ceremony of Floating Lanterns

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Ireland (Copper Coast European Geopark)	- Holding competitions by the officials for themed geopark cake (e.g. old mine wagon cake) - Holding a Pumpkin Carving Competition during Halloween - Organizing a kids' club dinosaur dig - Organizing flower shows - Holding festivals for themed geopark local products (e.g. animals made from geopark vegetables and fruits)
North Ireland ,UK, (Marble Arch Caves Global Geopark)	- Designing a geopark calendar - Providing The Marble Arch Caves Virtual Tour - Preparing Marble Arch Caves European Geopark Tour book - Introducing the first unique strategy for sustainable development - Preparing audio visual presentation - Using new ways of promotion such as Marble Arch Caves geopark on Facebook
Scotland (Lochaber Geopark)	- Installing a Mobile Phone Interpretation System (an innovative mobile phone interpretation system has been set up by a local software systems company) - Holding Mountain Festivals
Norway (Gea Norvegica Geopark)	- Designing a geopark calendar - Establishing Mølen's flora Park: a site for discovering the diverse vegetation
Malaysia (Langkawi Geopark)	- Providing a geopark song video - Promoting Malay herbal and spa treatments - Promoting ancient rituals and health - Organizing mangrove tours - Organizing elephant ride tours - Organizing cable car tours - Using new ways of promotion such as Langkawi Geopark on Facebook - Preparing Langkawi Geopark T-shirts

Table 4.2.17- Innovative strategies for development of geotourism in geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Iran (Qeshm Geopark)	- Writing the Atlas of Qeshm - Writing a bird atlas of Qeshm - Organizing mangrove tours - Participation of local communities in conservation activities of the geopark - Preparing the Qeshm Geopark virtual tour (in Persian language) - Designing a postage stamp on cooperating to conserve marine turtles - Holding traditional tournaments during festivals - Holding festivals such as *Nowruz Sayyad* Festival, Sea food festival, Summer festival and so on - Providing facilities for diving in the Persian Gulf - Using new ways of promotion such as Qeshm Geopark on Facebook
Japan (Itoigawa Geopark)	- Sightseeing tours by train - Selecting a salt path - Observing rocks, geo-hiking, and seeking stone sculptures - Establishing a spa therapy centre
Japan (San 'In Coast) Geopark	- Establishing the Marine Culture museum (exhibiting preserved creatures: fish and crustacean) - Establishing a sand dune information centre (exhibiting dune history and sand/wind phenomena such as wind patterns) - Establishing a small crab aquarium - Providing facilities for snorkelling and shallow water observation - Providing the first facility in the world for squeaking sand - Organizing hot spring tours - Providing facilities for sand dune paragliding
Australia (Kanawinka Geopark)	- Organizing aquifer tours to the Blue Lake Pumping Station

Table 4.2.17- Innovative Strategies for Development of Geotourism in Geoparks (cont.)
(Source: Farsani *et al*., 2012a)

Country/ Geopark name	Innovation
Australia (Kanawinka Geopark)	- Involving the locals in geopark activities - Organizing helicopter tours around the coastal areas - Establishing a geology room to hear and see an erupting neon volcano - Providing tourism facilities in a cave garden - Establishing the Lady Nelson Centre to discover history and geology - Organizing walking tours on the glass floor cave - Establishing an art gallery - Organizing local Markets such as: Mount Gambier Markets (every Saturday) and Blue Lake Market (every Sunday) - Providing facilities for geo-sports such as climbing - Designing a calendar of annual events
Brazil (Araripe Geopark)	- Holding an xylography exhibition of local artists - Exhibiting the transformation of leather into saddles, harnesses, bags, and sandals - Holding an agriculture exhibition in July containing an agriculture fair, auction of animals, local food, local concerts, and cultural attractions - crocodile watching and scuba diving - Using new ways of promotion such as Araripe Geopark on Facebook

Reynard (2008) noted that geotourists need different infrastructures, goods, and services to facilitate their visit (Figure 4.2.11). For example, cableways for accessing a remote geosite (crater), interpretative panels, or guided tours are elements offered to geotourism.

Results of the literature review of geoparks and questionnaires filled in by geopark authorities indicated that providing facilities for geotourists are mostly an extension of the Reynard model (Figure 4.2.12). Geoparks offer different facilities to tourists which they have never experienced in other tourist destinations. Geotourism is a market that strives to provide unique experiences for visitors through initiatives. For instance, boat tours in geoparks have added the geological story of the earth to their traditional interpretation.

Moreover, kayak tour guides are seeking information about geology to enhance their stories of the natural and cultural landscape. Trail designers are looking for geological information to develop interpretive signs along walkways. Tour operators working in the cruise ship market have considered tours of geological sites for ship passengers. Besides, geo-products not only make an opportunity for tourists to experience new and local products, but increase their knowledge about geology as well.

Lastly, providing new job opportunities, new accommodation, new facilities, and new products are initiatives of geoparks to attract more tourists to their territories.

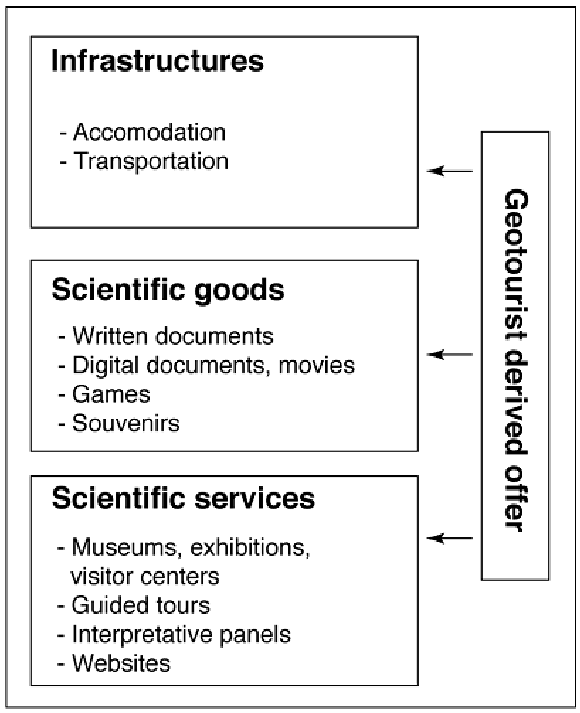


Figure 4.2.11- Typology of the derived geotourist offer (Source: Reynard, 2008)

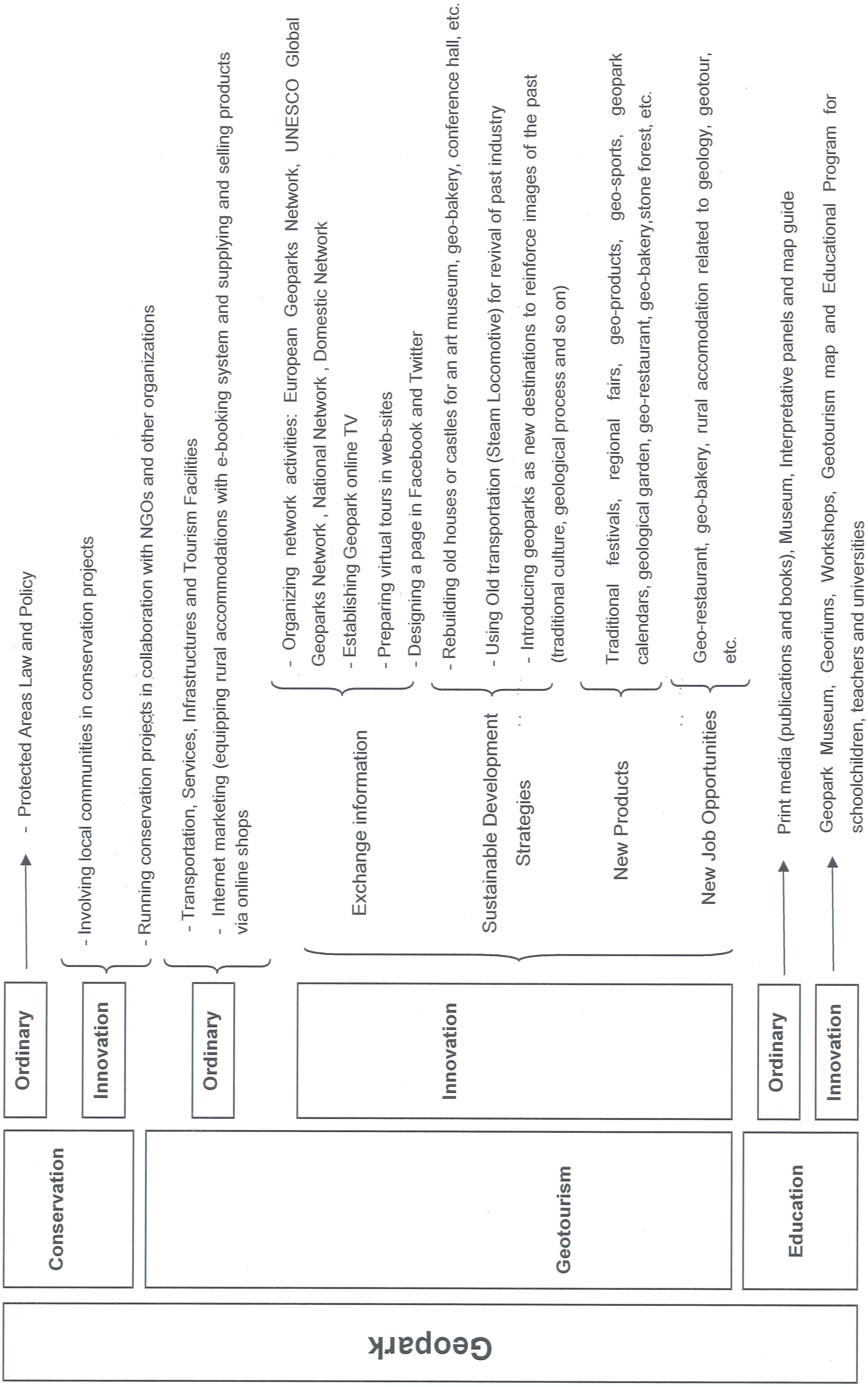


Figure 4.2.12- Geotourism offer through geoparks (Source: Farsani *et al.*, 2012a)

4.2.1. 6. Summary and Conclusions

Geoparks as open museums are established at International level but managed at local level; the clearest results of the investigation indicate that the majority of geoparks (52%) are managed officially, and in most countries geoparks (52%) are financially supported by local municipalities, therefore, geoparks do not function similarly in terms of management (H9).

Since the majority of geoparks are located in rural areas, geopark and geotourism are opportunities for cultural sustainability and rural development; they also reduce the rate of unemployment and emigration through engaging the local communities in geopark activities.

Geoparks authorities try to improve the local economy through geotourism, education, and conservation activities. Geopark authorities have taken some positive policies toward stimulating locals in participating in activities leading to local economy prosperity, cultural sustainability and preservation of natural resources:

Firstly, geopark authorities involve locals in conservation activities; creating a geopark in each territory engages an average of about 11 persons in geopark conservation activities in the form of voluntary, supplementary income, part-time, full-time ,seasonal, and second jobs (Mean= 10.53, SD= 14.78).

Moreover, the results indicate that the majority of geoparks authorities (83%) believe that conservation activities improve the local economy in their territory; for instance, geoparks employ and involve locals in preservation activities such as conservation projects, park guards and site surveillance.

The above results can confirm the first hypothesis (H1: Geoparks involve local communities in conservation activities). Accordingly, there is an interaction between socioeconomic development and conservation of the natural environment of the geopark.

Since organizing educational activities is a means for preservation of natural heritage, a geopark also fosters scientific research and cooperation with universities and research institutes, stimulating the negotiation between the geosciences and the local population. The results also indicate that the majority of geoparks (72%) have been equipped with workshop facilities and 56% of geopark authorities believe that workshops improve the local economy through involving locals, artists, geologists, etc. in workshops.

Accordingly, findings confirmed the seventh hypothesis (H7: Geoparks contribute to increasing the geological knowledge and employment of local communities in rural areas and geopark territories).

In the second strategy, geoparks encourage locals to participate in tourism activities; the results illustrate that the majority (80%) of respondents believe that involving local business people in tourism marketing is the best way to promote the local economy; moreover 68% of geoparks try to link their activities to other local tourism activities such as boating, bird watching, cultural activities, etc.

Besides this, geoparks with a view to the development of local economy strive to support the local products and services through a label (36%) or direct marketing of regional products (36%).

It is noteworthy that 48% of geoparks through creating second job or seasonal job for local communities attempt to generate supplementary income for them.

Moreover, the majority (84%) of geopark authorities noted that geotourism markets take advantage of the geopark brand; for instance geoparks apply geopark logos as a local environmental/marketing certification for hotels, local products and souvenirs. Geoparks use the logo for publications (geotourism maps, books, newsletters, monthly reports, etc.) and promoting geo-products. Thus, geotourism activities under the geopark brand create opportunities for local development.

The geotourism an ‘emerging tourism’ niche is still at an early stage of commercial development, but in the near future geoparks will be known as geotourism destinations for those who want to know more, and will be more active in the development of the local economy.

In the fourth strategy, geoparks – through promoting geotourism in their territory – strive to revive traditional culture and decrease the negative cultural impacts of tourism.

For sociocultural sustainable development, geoparks try to organize local markets for regional and agricultural products, to make souvenirs, to serve local food on tours, to hold workshops, festivals, fairs, local dances, local music, and educational programs. Moreover, geoparks through innovative strategies strive to introduce the locals’ traditional skills to tourists. For example, geo-products which are made based on geological elements of geoparks not only introduce the local products and the local handicrafts to tourists, but increase the public knowledge of tourists about geology. Thus, geotourism allows tourists and visitors to travel in their territory in order to get experience, learn from and enjoy our earth heritage.

Based on the results of the descriptive analysis, geopark activities promote regional food and craft businesses; the majority of the responders (80.0%) mentioned that geopark creation plays a role in promoting local cuisine, products, and handicrafts as cultural components.

According to the findings, geoparks attempt to revive traditional food, local arts, and traditional culture through exposing them to tourists; thereby, geoparks, by promoting geotourism and innovative strategies reduce negative sociocultural impacts of tourism in their territory. Consequently, geotourism can also contribute significantly to local cultural preservation, and the finding allows us to confirm H5 (Geoparks contribute to promoting regional geotourism products and local products) and H8 (Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by the local communities). This indicates that geoparks as pioneers in geotourism development can be considered as a sustainable base for the development of tourism.

Further analysis illustrates that annually an average of 7.8 million geotourists visit geoparks around the world. These numbers of geotourists in European Geoparks are about average of 4.3 million per year. According to network analyses, among geoparks, Vulkaneifel Geopark (links=35), Marble Arch Caves Global Geopark (Links=7), and Naturtejo Geopark (Links=6) are more active than the other geoparks in the field of tourism marketing. On the basis of the results of network analysis of this research, it can be concluded that Network activity in the EGN is stronger than in the GGN, and the GGN and EGN have concentrated their network activity on collaboration areas of meetings, conferences, and exchange of knowledge. In addition, geopark authorities attempt to develop tourism marketing in their territory. It can be said that the geoparks not only try to popularize the geological and geomorphological heritage and sciences, but also introduce geoparks and geosites as new tourism destinations.

The results can also provide some support for introducing geoparks as new geotourism destinations in the near future. On the basis of the results of this research, it can be concluded that geoparks, through promoting network activity, innovation and novel strategies, try to offer new geotourism facilities to visitors and can increase visitors' knowledge especially in the field of geology, geography, geodiversity, and culture.

CHAPTER 5- Sustainable Tourism in Qeshm Geopark (Iran)

Part 1- Characterization of the Geographical Area of the Case Study

5.1.1. Introduction

Experiences gained from the literature review and chapter 4 are gateways and guidelines for better management of the Qeshm Geopark. Innovative strategies and policies in geoparks around the world can help us to discover strengths, weakness, opportunities and threats in the Qeshm Geopark.

This chapter explains the characterization of the geographical area of Qeshm Geopark as a case study. It begins with a description of natural (geological, ecological) and cultural heritage in the geopark.

Since sustainable development indicators can lead to better decisions and more effective actions, indicators of Sustainable Development for Qeshm Geopark were collected in section 5.1.8. At the end, according to sustainable development indicators and experiences gained from geoparks around the world three SWOT matrices were designed for development of geosites, eco-sites and cultural activities in Qeshm Geopark.

5.1.2. Qeshm Geopark (Iran)

Qeshm Geopark with an area of 32000 hectares is located in the west of the Qeshm Island between the axes 26°, 44´, 62"N, and 26°, 35´, 00"N, and the meridian axes 55°, 44´, 28"E , and 55°, 44´,44" E in the Persian Gulf, Iran (Amrikazemi and Mehrpooya, 2005) (Figure 5.1.1).

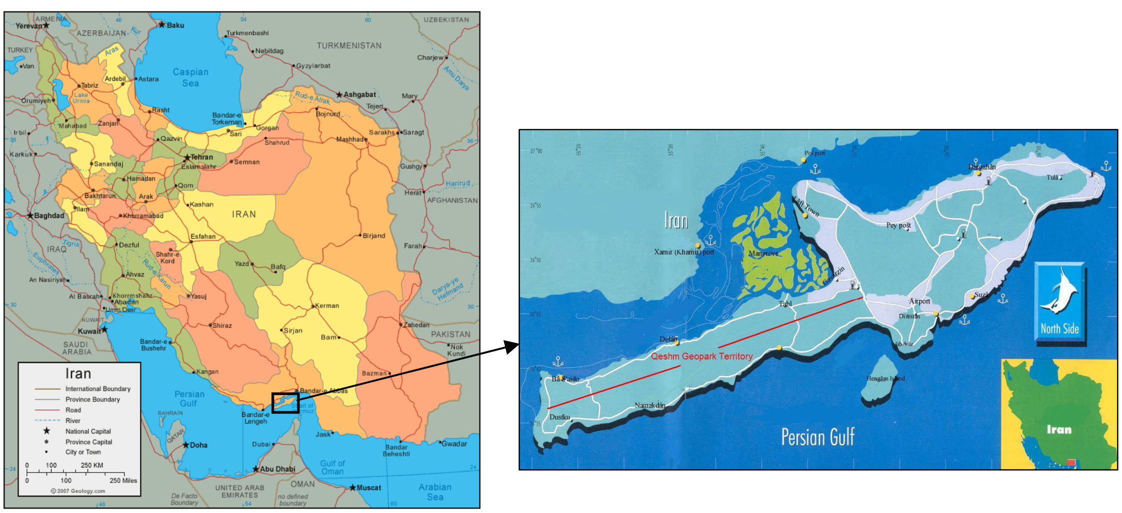


Figure 5.1.1- The location of Qeshm Geopark in Qeshm Island

(Source: www.geocities.com)

The average of annual precipitation in Qeshm is very low (163.4 mm) and the average daily temperature is about 27°C. According to the Statistical Centre of Iran (2006) the total population of the Qeshm Geopark is about 17355 people who live in 19 villages. The economy of the Qeshm Island is heavily dependent on fisheries, aquaculture, transportation, and trade. The rural population who live in the surrounding villages of geopark earn their living by fishing, trade, and tourism.

Qeshm Island Free Zone Organization was established in 1990 with the purpose of economic development, attraction of national and international tourists and entrepreneurship, implementation of public services, and accomplishment of infrastructures enterprises in the Island (Turner, 2008). Since the Qeshm Island Free Zone Organization was established, the structure of Qeshm Island transformed to duty-free status.

Pursuant to sustainable tourist attraction, the establishment of Qeshm Geopark was an important step for the development of geotourism and improvement of local socioeconomic activities. Therefore, for the establishment of Qeshm Geopark, Darehshoori and Dakhteh launched the initial research activities. Meanwhile, the primary geological report of Qeshm Geopark had been written by Haghipour *et al*, 2005 (Turner, 2008). After that, S. Turner as UNESCO advisory group of geoparks experts travelled to the Qeshm Geopark and prepared a report for UNESCO (Ziari *et al.*, 2008). Finally, the Qeshm Geopark was registered in GGN (Global Geopark Network) in 2006 and became the first geopark in the Middle East.

There are eight major sites in Qeshm Geopark including: *Chah-Kuh* valley, the valley of Stars, *A'li Channel, Tandis ha valley, Shour valley, Namakdan* caves and dome, *Doulab* and *Koorkoora kuh*. Furthermore, *Kase salkh* desert and the Roof of Qeshm are important geological monuments in this territory.

Beside the geological heritage sites, there is ecological and archaeological heritage in the Qeshm Geopark.

The management structure of Qeshm Geopark is semi-public administration and Qeshm Island Free Zone Organisation supports it financially. The geopark has close collaboration with UNDP (United Nations Development Programme) office in Tehran, Environment department, NGOs, and tourism sector.

As the Qeshm Geopark was selected as a case study in this thesis, geology formations and geosites of the geopark were discussed in detail, after that the ecological heritage (fauna and flora) of the area were considered. Lastly, in order to investigate the Strengths, Weaknesses, Opportunities, and Threats of the Qeshm Geopark, SWOT analysis method was used; SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) provides information in matching a firm's resources and capabilities to the competitive environment in which it operates.

5.1.3. The Geological and Tectonic History of the Qeshm Geopark

Qeshm Island is located on the earthquake belt of the world. The north of the Persian Gulf includes a part of the southeast of Zagros structural zone which has been deformed and folded as the result of the last phase of Alpine Orogeny in Plio-Pleistocene. The geological formations of this belt may belong to the Late Precambrian to Cambrian and include diapirs attributed to the Precambrian called the Hormoz Series, which has been active till now with a trend toward upper formations at the earth level. According to the majority of geologists, this region – from the tectonic point of view – has been active since the Late Tertiary as the tectonic zone in the south part of the deformed forehead or the convergent belt –Mesopotamia and Persian Gulf region – along with the margins of the compression and collision plates of Iranian-Arabic plate. The region located in the southeast stretch of the Persian Gulf along with Hormoz and Qeshm Islands can be identified by the structural, sediment logical and geological features such as the mainland – which is distant from it – with 2.5 km width in the narrowest parts.

Sea terraces of Tertiary sediments in Qeshm Island are partially accompanied by Quaternary deposits; therefore, they have resulted from the compressive tectonic forces related to Alpine Orogeny. Quaternary sea terraces are often horizontally stretched, while having a slight slope toward the sea. The older terraces, particularly those located on the anticline, have a steeper slope and some mild folding. The terraces are made of corals, zoomorphic shells, and deposited marine settlements in the old coastal regions whose thickness varies from a few to 10 metres. As for the composition, they contain coral deposits, limestone, and sandstone which often cover the formation of the thicker yet weaker bedrock with a Duricrust surface (Amrikazemi and Mehrpooya, 2005).

5.1.4. Geosites in Qeshm Geopark

5.1.4.1. The Valley of Stars

Berkeh Khalaf village is located 5 kilometres from the island’s south coast. In north of the village one of the masterpieces of hydro-aeolian erosion (caused by water and wind) can be seen. This site is outside the geopark area, but UNESCO has identified this site as one of the major sites, because of the existence of most beautiful geological and geomorphological phenomena in this valley (Appendix 24).

The geological formation is made by soft layers (Maren) which are very sensitive to erosion. The initial plateau which still remains more or less intact is located at an altitude between 7 and 15 metres from the bottom of the valley and it is made of limy sand stone and fossil limestone.

The valley is an ideal place for the study of different types of erosion. Meanwhile, this site is the best strolling and walking tour for tourists. The locals' income is generated by park guards on this site. Moreover, the valley of stars is a suitable place for astronomy, observation of stars, night photography, and night camping.

It is noteworthy that the geological formation of the valley of stars is made by soft layers (Maren), which are very sensitive and brittle; one can expect some tangible changes to occur in its morphology after each rainstorm. In future the tourist's visits and mass tourism may endanger this place, so controlling the number of visitors, selecting a path for tourist's walking and hanging sign posts in this path are the best ways to prevent erosion of this site caused by humans (Farsani *et al.*, 2009).

5.1.4.2. The Roof of Qeshm

The Roof of Qeshm is a quite high plateau dominating the island's north margin, which begins from the central parts and stretches along westward. This plateau is named "The Roof of Qeshm" since it is the most extensive highland on the island and one can view matchless landscapes from top of this viewing roof. The high-altitude parts of The Roof of Qeshm are mainly made of hard limestone that includes many shells, and on its slopes and margins one can see high lands of brittle sandstone containing marl and silt which have been intensely eroded. One of the best ways to the Roof of Qeshm passes by the Tabl village through which – at the end of the road after a 15 minute walk and climbing up the slopes – one can mount the plateau's surface.

Here one can find remnants of a ruined village which is called "Kalat Koshtar". In the ruins of "Kalat Koshtar ", one can see traces of very regular ancient walls, residential areas, polished rocky pieces, and some quite intact closed spaces, which are similar to animal pens or barns and have a structure resembling those of drainage and sewerage systems.

In addition, there are some pieces of pottery and baked mud bricks in the ruins which probably date back to the Islamic period. The interesting point there is the use of hard limestone in the region's constructions, which have been supplied by the upper limy layers of the plateau.

The existence of a water reservoir there suggests that in the past the natives of the two villages of Tabl (on the north coast) and Salakh (on the south coast) used to use Qeshm Roof as summer and winter resorts during hot and humid months.

The view of the Mangrove Sea Forest from above Qeshm Roof including the north coasts of Persian Gulf and the novel erosion scenes in south of the plateau is among the land-scapes which can keep people watching and contemplating for long hours; and maybe one could proceed to put up a tent to stay overnight there looking at the stars (Amrikazemi and Mehrpooya, 2005).

5.1.4.3. Chahkooh Valley (Tectonic – Erosion Phenomenon)

The *ChahKooh* valley situated in the southeast of the East Chahoo village is approxi-mately 85 km from the town of Qeshm.

In the vicinity of the Chahoo Village, at the north border of the west of the Island, one can see two crossed valleys with tall walls, which show quasi-karst morphology. On the bottom of one of the valleys extending from North to South, the south entrance is wider than the north side and shows a more or less U-shaped form. The valley gets less wide as it moves south, and at the end it becomes V-shaped so that one can hardly pass through it and there is also little light (Amrikazemi and Mehrpooya, 2006). These specifications are suggestive of the fact that the valley is the result of flooding. The valley walls show numerous trenches and erosion lines. Some of its trenches appear to be deeper and take spoon-shaped or funnel-shaped forms. The walls are mainly made of limy sandstone and due to the existence of red marl, silt, and limy inter-layers one can see intense dissolution and erosion so that many small and big holes appear all along the valley wall (Amrikazemi and Mehrpooya, 2005).

This strait, due to having quite high vertical walls, the existence of trenches, and parallel and deep erosion lines along with the various kinds of hemispherical and oval holes, enjoys a very special beauty (Appendix 25).

Besides the tourism potential, there are very deep well-like pits where flowing waters, after each rainfall, gathers in the valleys and is used by region's dwellers. It seems the digging of water wells, which are used by the natives, has followed the formation of the deep dissolution holes and in fact the work of nature has been completed by man. In addition, along the main valley and the crossed ones, we can see a narrow stream-like channel, which has been dug to lead the valley's waters into the well. So this valley is a traditional rain water harvesting system. This rain water harvesting system is one of the targets of sustainable development. Moreover, Chahkooh is a wonderful place for the study of different types of erosion.

Unfortunately, in some parts of the valley there are some mementos, which have been inscribed on walls by tourists that detrimentally affect the landscape. Moreover, in future the tourist's visits and mass tourism may endanger this place; therefore a control of the number of visitors is the best way to prevent erosion of this site caused by humans. Because of high visiting demands on *Nowruz* holidays, Qeshm Island Free Zone Organization has invested on some basic infrastructures including: rubbish bins, asphalt roads, toilets, parking areas, guard kiosks, and signposts (Khademi, 2008).

5.1.4.4. Three Namakdan Salt Cave

Caves in some parts of the world are formed in a very soluble material: salt. The most significant of these caves are found in arid regions, such as the Atacama Desert in Chile, Israel, and Iran. Several expeditions of the Czech cavers have discovered the longest salt cave on Qeshm Island in the Southern coast of Iran, the 3N Cave, 6580 metres in length (Filippi, 2007). The 3N salt cave has developed in the SE part of Namakdan salt diapir in the western part of Qeshm Island (Figure 5.2).

Salt Diapirs and salt caves, which are rare and unique phenomena in the world, have a high degree of importance in the creation of Qeshm Geopark and development of geotourism in this region (Asadi *et al.*, 2008). There are some unique and aesthetic underground phenomena in 3N cave including: micro climate, alluvial fan, meandering, salt speleothems, curved stalactites, shafts, waterfalls, chimneys, and a salt lake (Appendix 26).

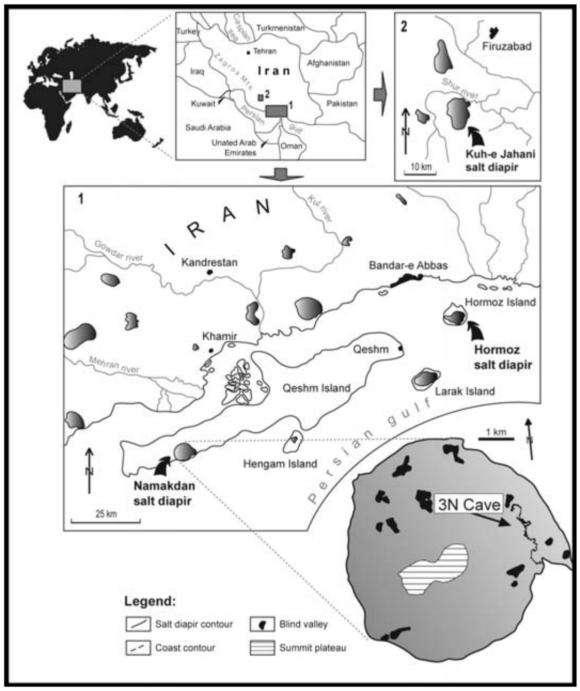


Figure 5.1.2 - The geographic location of 3N salt cave, Qeshm Geopark, Iran, (Source: Asadi, *et al*., 2008)

Beside their tourism potential, salt caves are used for relaxation and treatment of respiratory tract diseases, allergies, and chronic bronchitis (Mahmoodi and Ramezani, 2008). The unique microclimate in salt caves treats skin diseases such as psoriasis or acne. The air in the salt caves is enriched by particles of iodine, potassium, sodium, calcium, magnesium, selenium, bromine, and many other elements that are essential for the proper activity of the human organism.

Nowadays, there are many artificial salt caves in the Czech Republic and Poland where walls of these relaxation rooms are made of massive salt blocks and the floor is covered with a 20 cm thick layer of salt. There is also a salt pillar, a waterfall, and air moisteners in the cave. For children, there is a salt pit where they can play. Annually countless visitors spend their leisure-time in these artificial caves.

Consequently, after implementation of infrastructure and conservation methods in Qeshm Geopark these natural salt caves can be visited by tourists.

In addition to tourism development, Namakdan diapir is a salt mine which can help locals in generation of income through salt extraction. Salt extraction is forbidden in 3N salt cave since it is one of the major sites of geopark, but local companies and people extract salt from other caves around the Namakdan diapir.

Furthermore, salt caves and salt diapirs are unique geological phenomena; therefore geologists, speleologists, cave explorers, students, and researchers are the major visitors of this geopark site. However, at present there are not enough infrastructures for public tourists (asphalt path, interpretative panels, signs, etc.). In recent years as a result of encountering tourist’s visits and mass tourism, one Namakdan salt cave was damaged and many beautiful cubic crystals and stalactites were devastated. Moreover, entering the salt dome surface as well as caves is extremely hazardous and can easily result in serious injuries or even death of visitors. Hence, the local administration decided not to advertise this geopark site before implementation of the infrastructures.

Recently, the planning management is in the execution phase and a 3N salt cave hall was selected for visitors. For the attraction of tourists to this sensitive site, consulting with the caver specialists who have researched on conservation methods and tourist facilities is very important because salt domes, or salt caves, are an extremely dynamic environment that changes very rapidly and needs control management.

5.1.4.5. Tang-e-Ali Gorge

Tang-e-Ali gorge is located in the west part of the island – south of East Chahoo village – and generally extends along the north-south line. The gorge north entrance is about 2 km from the north coast via East Chahoo village, and while its mouth is initially wide, after travelling for less than 50m, it immediately becomes narrower.

Also the thin layer of clay and marl on the gorge floor – in which so many cracks are observable and show high viscosity – is a reason for the high rate of moisture in this gorge.

Many holes and trenches can be seen in the walls of the gorge which are hemispherical, spoon-like and niche-like shapes and are among the main elements of beauty in this gorge. The linear and niche-like trenches and furrows can be seen parallel at many points and the reason behind this is the dissolution and erosion which has occurred in the clay and marl inter-layers that are more susceptible to erosion than limy sandstone (the main part of the walls).

In addition, the existence of clay and marl in these layers and their being spoilt by erosion has created these hemispherical shapes. The rapid and whirling movement of water in times of torrent is another factor, which led to erode the layers and created blade-like and wedge-like forms with sharp edges.

In the walls of the gorge, one can see numerous small and big joints as well as a few faults, which most probably are the result of the movements in the neighbouring salt dome. In the middle of the gorge, the course gets very rough and narrow and walls come tightly toward each other so that in some parts one should use one's hands to be able to pass through. The gorge at its south end meets the southeast walls of the Namakdan salt dome and its course toward the south coast is completely different from the northward course; here the manifestations resulting from the outcropped salt dome are observable (Amrikazemi and Mehrpooya, 2005).

5.1.4.6. Tandis ha Valley

Almost throughout the island, one can find a wide array of beautiful phenomena created by water and wind erosion. This site is similar to the valley of Stars, but more extensive and the density of the phenomena congestion is lower but with more frequency. The *Tandis ha valley,* which is located approximately 75 km southeastern of Tabl village, is a typical site for observation of erosion features (Amrikazemi and Mehrpooya, 2005). Among the numerous forms of erosion we can name the column erosion such as chimney rocks, mushroom-shaped, arched, global, kidney-shaped forms, small and big cones and pyramids, as well as the shapes similar to human profiles and different animals (Appendix 27).

Beside the *Tandis ha valley* there are many erosion features in other geopark geosites, for instance the *Koorkoora Kuh* site, which is located near the Giyahdan village, encompasses beautiful landforms with hills in the shape of pyramids. At this geosite, which is situated adjacent to date palms and the ancient dam (Sasani dam), appears an attractive path for taking tours for a stroll.

In addition, the *Doulab* geosite which is situated near the Doulab village with badlands on sedimentary foothills has created an attractive place for adventure tourism. The last but not the least geosite is the *Shour valley* which is located near the Salakh village. This site has a high potential for rural tourism; there are different scale erosion landscapes in the Shour Valley. The sulphurous spring and traditional treatments by local people in this site are other tourist attractions in this territory.

It is worth mentioning that springs of the Qeshm Island are salty and they have no fresh water. *Kargah* is known as an important sulphurous spring and *Goori* as a salt spring in this geopark.

5.1.5. Qeshm's Coasts

Apart from Simin Beach, which provides suitable entertainment facilities by a calm sea as well as a beautiful less steep coast, Qeshm has various intact coasts, which may welcome people with a variety of tastes. Namakdan mount which near the coast, due to being rich in shiny particles of Oligist, which have been accumulated on the very cream bed of fine grains of sand, has become a shiny and silvery coast.

Various ripple marks in some parts have covered a distance about 50m without any disruption and diversion, which is itself suggestive of the sea’s peacefulness, lesser steepness, and homogeneity in the kind and size of the coastal sands.

The coastal terraces can also be seen in different regions. Because of the terraces walls being so hard, the erosion factor has affected them less, therefore one can see a rocky face full of jagged edges. The crashing of waves on these walls and the rocks' firmness and steadiness are associated with the everlasting fight between the sea and the coast.

The crustacean accumulation of various species of bivalves, gastropods, and particularly crabs in these regions show the untouched of coasts whose natural visage is a point of interest. Generally, the south coasts of Qeshm Island can be considered as the most beautiful and most intact coasts in the Persian Gulf.

Furthermore, watching the droves of camels near coasts of the Persian Gulf and roads of geopark is another tourist attraction which is unique among the other geoparks.

5.1.6. Ecological Resources

Beside the geological sites, the Qeshm Geopark has variety in ecological sites. There are four major ecological sites in the Qeshm Geopark including: Harra sea forest, coastal coral, coastal Hawksbill turtles, the natural aquarium, and dolphin settlement.

5.1.6.1. Noteworthy Fauna

Various insects, reptiles, birds, and mammals live in Qeshm. Among the mammals, gazelles, camels, and dog-foxes are famous in this area. More than 50 species of bivalve molluscs, gastropods, cephalopods, echinoids, and corals can be found on the Qeshm coasts. There are different kinds of shrimps, shells, sea urchins, sea porcupines, and sea cucumbers in the Qeshm waters. Moreover, a type of amphibian known as Gel-Khorak (*Boleophthalmus dussumieri Valenciennes*) can be found in the mangrove sea forest.

The number of migratory bird species in the island reaches 70. The mangrove sea forest is an important breeding site for herons and numerous species of plover (*Charadriidae*) pass through the area on migration. During the winter the mangrove sea forest is an important feeding site for herons, plovers, and sandpipers (*Scolopacidae*) including the grey heron (*Ardea cinera*), redshank (*Tringa totanus*), Terek sandpiper (*Xenus cinereus*), bar-tailed godwit (*Limosa lapponica*), and curlew (*Numenius arquata*). This site is even more important for the wintering flocks of Dalmatian pelicans (*Pelecanus crispus*), spoon-bills (*Platalea leucorodia*), and greater flamingos (*Phoenicopterus ruber*). Marine turtles such as green turtles (*Chelonia mydas*) and Hawksbill turtles (*Eretmochelys imbricata*), the finless porpoise (*Neophocaena phocaenoides*), the humpback dolphin (*Sousa chinensis*), and the common dolphin (*Delphinus delphis*) are regularly seen in the area.

The green turtle, the Dalmatian pelican, the cab plover, and the curlew are endangered species (UNESCO, 2008). The variety of fishes in the waters surrounding the Island is very wide and different kinds of commercial, aquarium fishes and ornamental fishes as well as sharks and whales can be found in the Persian Gulf. During the summer they lay eggs on the coasts neighbouring the Shibderaz or Namakdan mounts (Amrikazemi and Mehrpooya, 2005).

Moreover, ecotourists can watch the Qeshm eagle in this geopark. The biodiversity of Qeshm illustrates that this geopark has high potential for recreational activities such as bird watching, wildlife watching, scuba diving, and snorkelling.

5.1.6.1.1. Hawksbill Turtles

For thousands of years, marine turtles have been a source of food and sustenance for coastal communities in tropical and subtropical regions. Human activities, overexploitation, fisheries by catch, and habitat destruction have been identified as the main reasons for marine turtle decline (Spotila *et al.*, 2000).

Today, six of the world's seven species of marine turtle are classified as endangered (Troëng, and Drews, 2004). Hawksbill turtles as endangered species are most commonly found in hard-bottomed and reef habitats containing sponges (Edelman, 2004).

The Shibderaz village which is located in the centrally- southern coastline of Qeshm Island, is currently the only stretch used in the entire Island by Hawksbill Turtles (*Eretmo-chelys imbricata*) for nesting and laying eggs. This site has been selected as a major ecological geopark site.

The sea turtles of Iran are all mentioned in the CITES list (Convention on International Trade in Endangered Species), and their hunting and sale is legally forbidden. The Environmental Protection Organization is responsible for protecting regions where turtles lay their eggs. Fortunately, studies related to the egg-laying zones and the identification of the species have been completed in recent years (Daanehkaar, 1998).

It is worth mentioning that consumptive use of marine turtles for meat, oil, leather and shell, is unusual in peripheral areas of the Qeshm Geopark but the eggs are endangered by dog-foxes and illegal human activities.

The Shibderaz Village coastline is an important and strategic Hawksbill hotspot, and in 2002, the Bureau of Environment and Qeshm Free Zone Area (QFA) received reports of Hawksbill Turtles laying eggs near Shiebderaz Village; hence, Bijan Darehshoori, director of Qeshm department of Environment (2001), with the help of indigenous people and UNDP, changed Qeshm into an environmentally sustainable Island (Turner, 2008). He encouraged and engaged locals in collecting and protecting the eggs (Appendix 28). His enterprises brought sustainable use and recycling for the turtle hatchery (UNDP 2003a).

At present, the environment department has an important role in the management structure of the Qeshm Geopark. It tries to encourage locals to participate in conservation activities of this geopark site and take advantage of indigenous knowledge. Aside from local involvement in conservation of turtles, the Qeshm Geopark authorities try to train locals as tour guides for turtle watching tours, which is a strategy for the development of ecotourism and geotourism in this area.

It is evident that, local economic development and conservation issues are therefore complex; conservation strategies to recover marine turtles must embrace local economic benefits, so engaging stakeholder groups in tourism and involving local people in conservation projects are important strategies in local economic development. In recent decades, regarding the economic potentials of marine turtles, their non-consumptive use in the form of tourism to observe marine turtles in-water and on nesting beaches has gained popularity throughout the world.

With reference to Dodds (2006), tourists were travelling to Rantau Abang in Malaysia to watch nesting leatherback turtles as early as in the 1960s. In the 1980s, tourism to observe marine turtle nesting began in the Turtle Islands Park in Sabah, Malaysia, and in Tortuguero National Park, Costa Rica. Recently, 8,450 and 32,854 tourists, respectively, visited these sites each year to observe marine turtles nesting.

In the 1990s and during the first years of this century, marine turtle tourism has become popular at many sites in Africa, the Americas and Asia. Each year, more than 175,000 tourists participate in marine turtle tours. The St. Lucia Heritage Tourism Programme announced a 100% increase in one year for turtle watching tours. The operator declared a gain of US$27,000 in 2005 up from US$13,500 in 2004.

In addition, gross revenue for non-consumptive use can be estimated, by multiplying tourist expenditure by the number of tourists participating in sea turtle watching. For locations where marine turtles represent a major generator of revenue, the estimate includes all expenditure (food, souvenirs, accommodation, transport and other costs) incurred by tourists during their time at the turtle-watching sites.

Theoretically, marine turtle tourism can stimulate people to travel abroad and hence cause an increase in international travel and augment resource use.

It is noteworthy that tourism development can have both positive and negative impacts on turtles. In Rantau Abang, uncontrolled tourism in Malaysia affected the behaviour of nesting leatherback turtles. On Zakynthos Island, Greece, lights from hotels, restaurants, and compacting of sand by cars and tourists have changed the distribution of loggerhead nests on Laganas Bay beaches.

The economic benefits from tourism can only be sustainable in the long term if appropriate control measures are taken. On one hand, tourism can result in decreased marine turtle mortality and in supporting positive population trends if it creates economic incentives for stakeholder groups to stop overexploitation; and on the other hand, tourism has a large ecological footprint because it stimulates air travel, direct use and non-consuming uses of marine turtles such as the souvenir market with tortoiseshell.

Therefore, encouraging tourists not to buy any marine turtle products is another strategy to prevent illegal use and overexploitation; furthermore, the presence of scientists, tour operators, and tourists on nesting beaches is a deterrent against the illegal taking of turtles and eggs (Troëng and Drews, 2004).

Regarding this, the Qeshm Geopark authorities hold a workshop for local people of Shibderaz village and train some turtle watching tour guides, turtle night guards, turtle day guards, and some guards to collect turtle eggs in the night and day. These strategies have not only preserved the marine turtles but have created some new job opportunities (in the form of seasonal and part time work) for local communities of Shibderaz village.

Moreover, officials of geopark with the help of UNDP have established rental rooms and souvenir workrooms in this village which offer facilities to tourists together with promoting local economy.

5.1.6.1.2. Coral Reef

Coral reefs are vital ecosystems providing a source of income, food, and coastal protection for millions of people. Coral reefs are composed mainly of reef-building corals: colonial animals that live symbiotically with single-celled microalgae (*zooxanthellae*) in their body tissue and a calcium carbonate skeleton. Coral reefs are found in warm, shallow, clear, low-nutrient tropical and sub-tropical waters, with optimum temperatures of 25-29ºC, although they exist in temperature ranges from 18ºC (Florida) to 33ºC (Persian Gulf) (Grimsditch and Salm, 2006). They are incredibly diverse, covering only 0.2% of the ocean's floor and they are often dubbed the tropical rainforests of the oceans (Roberts, 2003).

Unfortunately, coral reefs are also one of the most vulnerable ecosystems in the world. Disturbances such as bleaching, fishing, pollution, waste, and climate change endanger this ecosystem.

The Persian Gulf is a semi-enclosed marginal sea surrounded by landmasses and is located in the subtropical northwest of the Indian Ocean. The Persian Gulf has imposed a harsh condition on the marine organisms, especially coral reef communities with regard to salinity, temperature, and extreme low tides. This is a very shallow sea with an average depth of about 35 meters, and was above sea level 10-15 thousand years ago. Present climatic conditions force extreme rates of evaporation, which exceed precipitation and fresh water inputs, thus driving the average salinity above 40 ppt. (Fatemi and Shokri, 2001). In addition, the natural environment of the Persian Gulf is very rich with good fishing grounds, extensive coral reefs, and rich pearl oysters, but its ecology has come increasingly under pressure from heavy industrialization and in particular, the repeated major petroleum spillages most of which are associated with recent wars such as Iraq and Kuwait which occurred in the region. Coral reefs are located among Qeshm, Larak, and Hengam Islands. These sites are outside the geopark area, but announced as one of the sensitive ecological sites.

It is worth mentioning that goods of coral reefs in general are sub-divided into renewable resources (fish, seaweed, etc.) and non-renewable goods such as mining of reefs (sand, etc.). The services of coral reefs in general are categorized into: physical structure services, such as coastal protection; biotic services, both within ecosystems (e.g. habitat maintenance) and between ecosystems (e.g. biological support through mobile links); bio-geo-chemical services, such as nitrogen fixation CO_2 / Ca budget control, waste assimilation.

Moreover, sea food products, ornamental fishes, medicines, raw materials (e.g. seaweed), curios and jewels, live fish and coral collected for aquarium trade, sand for buildings and roads, physical structure services, biodiversity and a genetic library together with promoting growth of mangroves and sea grass beds and generation of coral sand biotic services are other economic potentials in this ecosystem (Cesar *et al.*, 2002).

The coral reefs of Larak, Hengam, and Qeshm Islands are unique ecosystems for involving locals in conservation projects and recreational activities such as scuba diving and snorkelling.

Unfortunately, reefs are broadly recognized as being limited to warm, shallow, and fully saline waters. Even a small amount of pollution brings significant impact on the lives of the marine creatures in the Persian Gulf. Corals in the region live in relatively warm temperatures that average up to about 36ºC in summer. In addition to pollution from the oil tankers which is considered as the major threat to the region's ecosystem, industrialization, the building of numerous piers and docks as well as the increase in the water salinity resulting from global warming all inflict serious damage to the existence of the marine life in one of the world's unique locations.

Due to the uncontrolled and hasty urban development and emergence of the urban and industrial sewages in the sea especially in the southern parts of the Persian Gulf by the United Arab Emirates and other littoral states, the coral reefs of the region, in particular those around the Iran’s Islands like Qeshm, are being silently and gradually suffocated (Maghsoodloo and Eghtesadi, 2002).

Climate change is a natural hazard for coral reefs, and in 1996 and 1998 El-Nino endangered this ecosystem in Persian Gulf and increased coral bleaching (whitening) (Wilkinson, 1998).

Moreover, these days Cochlokinium (harmful alga) decreases the coral reefs in this region (Ansari nasab, 2009). The last but not the least problem is illegal human activities such as thievery of coral reefs for the aquarium trade (Zohoori, 2008). But, the coral reefs of Qeshm, Larak, and Hengam are under the protection of geopark and Environmental Protection Office of Hormozgan province; so coral thievery and sale is legally forbidden. The Marine Environmental Bureau started the study of the vulnerable marine zones of Iran in 1994 with a project entitled "A Survey of the Vulnerable Marine Zones of the Persian Gulf and the Oman Sea". It focused on the study of the mangrove thickets, marshes, coral reefs, sea turtles and marine mammals, the waterfowl, the mud flats, the sandy beaches, the rocky shores, estuaries, and bays and creeks in this area.

In addition, officials of the geopark encourage locals to participate in conservation projects. In this regard, a pilot project in Salakh village was developed for the rehabilitation of the natural marine resources through an indigenous method of artificial reefing. This project was supported by the United Nations Development Program Regional centre in Iran (UNDP, 2001).

Moreover, coral reefs are among the world's most spectacular ecosystems, and snorkelling and scuba diving are excellent ways to explore them. As coral reefs face an increasingly uncertain future, snorkelers and other coral reef visitors can play an important role in helping protect these fragile habitats; hence a company with the help of officials of the geopark established a scuba diving school in this region.

Recreational activities can in fact harm coral reefs by breakage of coral skeletons and tissue as a result of direct human contact such as walking, touching, or dragging gear; breakage of coral skeletons and tissue from boat anchors and also water pollution are other negative impacts of marine tourism (Kerr *et al.*, 2004). Thus, for sustainable marine tourism, the manager of the geopark and diving school should observe the following guidelines in tourism management planning: (Huse and Wilson, 2007).

- *Recreational scuba diving trips should not be organized in sites prohibited by national or local authorities*
- *Recreational scuba diving is limited to diving no deeper than 40 meters (130 feet)*

- *Training, educating, or information sharing on scuba diving services should be provided by the diving excursion guide*
- *Environmental education should be organized prior to or during guided diving excursions*
- *Marine recreation providers should employ dive leaders who can communicate with at least 80 percent of the clients in their language and have facility in the local language. All staff training and education should be in the local language used by dive leaders*
- *A guided scuba diving group should not exceed 8 divers. All groups must be under the overall control of the dive leader who will assign a dive leader assistant to each group. The dive leader accompanies one of the groups. A dive leader assistant aids the dive leaders in enforcing the safety and environmental practices*
- *A dive leader should oversee all guided scuba diving activities. If the groups are large, the dive leader should have additional dive leader assistants. Dive leaders and assistants should share information and provide leadership to clients both above and under water by enforcing all provisions of the preferred practices for environmental behaviour*
- *Water entry points from boats, in waters less than 3 meters (9 feet) deep, should lie over sand or rubble, not coral, or in water of sufficient depth that divers can make adjustments and become acclimated with minimal impact on corals or sea grass beds*
- *Coral parks and other conservation projects should be supported*
- *Purchasing souvenirs made from coral or other marine life by tourists should be avoided*
- *Tourists should avoid touching corals; even a slight contact can harm them*
- *Tourists should avoid using gloves and kneepads in coral environments*
- *Guides and managers should make sure garbage is well stowed, especially light plastic items and cigarette butts*

5.1.6.2. Noteworthy Flora

The Floristic list of Qeshm Island illustrates that there are 314 species and subspecies of vascular plants in 202 genera. The Island's major vegetations are as follows: mangrove forests, halophyte vegetation, psammophyte-halophyte vegetation, vegetation on the eroding terraces, and arid woodlands (Attar *et al.*, 2004).

The first and most important plant community in the Island is mangrove sea forest that contains a grey mangrove (*Avicennia marina*) locally named *Harra*. The *Harra* tree, whose scientific name is attributed to the Iranian physician and philosopher *Avicenna*, is a small tree – from 3 to 6 meters – with bright green leaves and twigs.

Besides the mangrove, on the sandy beaches one can see some scattered *Acacia* and *Prosopis*, and in the shallow coastal waters red and brown algae (*Rhodophyceae and Phaeophyceae*) (Attar *et al.,* 2004).

The holy fig tree with aerial roots (*Ficus Religiosa*) is another tourist attraction in the Qeshm Geopark.

5.1.6.2.1. Mangrove Sea Forest

One of the most unique environments found in nature is the mangrove forest. The mangroves forests are the halophyte forests which are distributed alongside the coastal zone in tropical and subtropical regions. They are the forests that appear homogeneous on the surface, with few land species but enormous aquatic and marine wealth. This eco-system is found at the junction between land and sea. The principal characteristics of mangrove tree species are their high tolerance to salinity.

Between Qeshm Island Geopark and a part of the coast of Hormozgan Province, there is an ecosystem that contains a grey mangrove (*Avicennia marina*) locally named *Harra*.

The mangrove forest of the Qeshm Geopark was designated on the Raamsar convention's list of international lagoons in 1975 as well as a Biosphere Reserve in 1976 (UNESCO, 2008). This natural ecosystem is unique amongst mangrove habitats in West Asia because of its vast area, and its adaptation to very hot weather and more saline sea water (over 40 ppt.).The mangrove zones provide a suitable habitat for invertebrates. The *Harra* sea forest is an important breeding site for migratory birds.

About the economic potential of the Mangrove Sea forests, this ecosystem performs several functions, such as absorbing pollutants; they are places for juvenile stages of organisms to live, soil reclamation forest, forest flood control, and shelter for wildlife. Mangrove forests are very important for coastal environments and ecosystems, since they can protect the coastline from erosion and rises in sea level. There is a high sedimentation rate in these forests so they can build land. Indeed, mangrove forests serve as a buffer zones between marine and land ecosystems.

Beside the ecological aspects, mangrove forest has direct socioeconomic functions such as fuel harvesting, timber industry, fish catching, paper materials, and pharmacology, and indirect functions such as aquaculture projects like shrimp farming pools (Hossainipour Kooveei *et al.*, 2005).

The sea forest of mangrove of Qeshm Island has great economic potential for fish catching, charcoal production, cattle fodder, and bee-keeping, among others. Nevertheless, this ecosystem is endangered and ought to be legally controlled as an economic activity.

Besides non-renewable resources, the mangrove forests of Qeshm play an important role in ecotourism and recreational activities. For attracting more tourists to *Harra* forest, forest leadership is necessary and the geopark is the key actor to provide some basic infrastructure.

Experiences in Togean Islands, Indonesia, have shown that the money spent on these infrastructures was compensated by the additional income generated by the tourism industry in the area (UNU, 2005). In this regard, the local government of the Qeshm Geopark tries to develop infrastructures in the geopark. These enterprises promote socio-economic activities and well-being of indigenous people with the help of tourism marketing and conservation methods in the geopark.

Qeshm Island Free Zone Organization and geopark have planned to cruise the tourists around *Harra* Sea Forest in local small boats (Farsani *et al.*, 2008). Piers of Tabl and Soheili villages were equipped and developed by local administration, receiving passengers and tourists to visit these sites. This project has created some job opportunities for locals.

It is noteworthy that the mangrove sea forest of Qeshm is endangered. The restoration of mangrove trees takes a long time. The mangroves take more than 20-30 years to recover from severe oil spill impacts (Hoff *et al.*, 2002). Additional impacts such as hurricanes, natural or man-made impacts such as harbour infrastructure and industrial development like oil refineries, ports, airfields, and shrimp farming pools damage this ecosystem significantly.

Nowadays, the mangrove forest of Qeshm Geopark is threatened. The first problem is the increase of building industry of heavy harbour in Khouran region which is a great menace for the survival of *Harra* forest (Yousefi Azar, 2008). In addition, 80% of the Qeshm Geopark population are rural people and suffer from desertification phenomena in this region. They enter illegally into the *Harra* protected area in boats, and break the branches of *Avicennia marina* for charcoal production and use the leaves of *Harra* for cattle fodder. They are not aware that this leads in desertification (Yousefi Azar, 2008).

The shrimp farming pools established in the mangrove, near the Khouran region, are another threat to *Harra* forest.

The last but not the least problem is oil pollution from shipping and oil tankers that threatens *Khouran Strait* mangroves and also diffuses water pollution coming from the nearby coastal city of *Bandar Abbas* (Sebastian Lassen, 2008).

For the sake of the *Harra* Sea forest protection, mangroves in Qeshm are under the protection of Environmental Protection Office of Hurmozgan province.

Since 1992 desertification has threatened the Qeshm Island, thus the Natural Recourses Department of Hurmozgan province has launched a plant propagation of *Avicennia marina*. Annually many of these species are planted in *Harra* region especially on 5th March - the day of afforestation in Iranian culture. Regarding this, officials of the geopark, through encouraging locals in plant propagation of *Avicennia marina* in mangrove Sea forest ecosystem, create supplementary income for locals.

Furthermore, environmental agencies located in the Qeshm Geopark have agreed on preventing the establishing of heavy harbours and traffic of heavy ships near the *Harra* forest, because these transportation activities have undeniable impacts on this ecosystem (Hossainipour kooveei *et al.*, 2005).

In *Harra* Sea forest, ecotourism can play a role, as a low risk economic activity, in generating income for the local communities. Hence, officials of the geopark should encourage tourists and guides to observe sustainable tourism guidelines in this endangered ecosystem.

For instance, the boatmen should avoid wake speed; “wake” is a path of disturbed water left behind a moving boat; “no wake speed” means there is no “white” water in track or path of the boat or the white water created in waves immediately by the boat and in no case greater than 10 kilometres per hour.

In addition, servicing engines to minimize discharge of pollutants into the environment and maximize performance and fuel efficiency is an important sustainable strategy. The last but not the least solution is environmental education prior to or during recreational boating activities directed by guides or boatmen.

5.1.7. Cultural Heritage and Sites in Qeshm Geopark

Qeshm Island in the south of Iran is a very strict traditional region; local people wear traditional clothes and the local women use henna tattoo designs in marriage ceremonies. The local communities also hold traditional annual festivals such as *Nowruz Sayyad Festival*; *Nowruz* in Persian means new day, and typically refers to the Persian New Year Festival, and *Sayyad* means fisherman.

In Qeshm Island, the sea and fishing play a major role in people’s livelihood. *Nowruz Sayyad Festival* is celebrated at the beginning of the main fishing season in late July; one of the most extensive celebrations is held in the *Salkh* village in south of Qeshm Geopark. At this time local fishermen stop fishing, because they believe that the fish should have a chance to reproduce.

Therefore, everyone goes to the sea to bathe and start the new fishing year. Then, they wear new clothes and prepare various dishes, which should not contain any fish or seafood.

Other traditions in this festival are the playing of drums by a group of men dressed in white, accompanied by another group singing joyful songs whilst moving in harmony with the rhythm of the drums. There are also various contests such as rowing and tug-of-war. Besides this, two men wear black clothes and play out an interesting theatre (Jadidonline, 2009).

It is noteworthy that the *Nowruz Festival* (the traditional Iranian New Year in the first of spring) and religious festivals are other ceremonies held in this Island.

Aside from traditional festivals, there are many archaeological heritage sites in Qeshm Island some of which are located in the geopark territory and some others are out of that.

As for Qeshm history, since Qeshm has strategic importance, the Portuguese, English, and Dutch competed for influence in the region (Potts, 2004).

Hence, there are some archaeological heritage sites from them such as English and Portuguese cemeteries in Qeshm. Portuguese fortresses in Qeshm and Hormuz Islands, which were built during domination of Portuguese on Persian Gulf, are another tourist attraction in these islands. Recently, Gulbenkian has set up a project for rebuilding castles in Iran, so they are trying to negotiate with Iranian governors (Lucas Coelho, 2009).

Naderi castle, water reservoirs, pilgrimage sites, and mosques, are other historical sites in Qeshm Geopark territory. Moreover, the Giyahdan village with its wind towers and mosques is recognized as a historical site for tourists.

A series of both natural and manmade caves in the heights of a mountain of Qeshm Geopark, named "*Kharbas Caves*", is another item of cultural heritage in this territory and is a symbol of the ancient settlements.

Furthermore, the architectural facets of the dwellings in the *Loft* village can be another cultural tourist attraction in this rural area. The main architectural features are the traditional air vents or ventilators in various sizes (Appendix 29). The buildings or houses in this village are constructed close together and streets are extremely narrow (Nouroozi *et al.*, 2001). There are 366 well-known wells in the Loft village near the port which are known as *Tala*. It is noteworthy that the numbers of wells are more or less the symbol of the number of days in a year (365); in the past the local communities of this village got water from one well each day (Appendix 30).

Regarding cultural sustainability, Qeshm Geopark authorities try not only to organize regional festivals and fairs but also, in order to revival local handicrafts, they established two handicrafts workrooms in rural areas. Chapter five, part 2 will explain in more detail about the role of the establishment of Qeshm Geopark in cultural sustainability.

5.1.8. Indicators of Sustainable Development for Qeshm Geopark

Sustainable development indicators can lead to better decisions and more effective actions by simplifying, clarifying, and making aggregated information available to policy makers. They can help to incorporate physical and social science knowledge into decision-making; they can also help to measure and to calibrate progress toward sustainable development goals. Sustainable development indicators can provide an early warning to prevent economic, social, and environmental setbacks. These indicators are important for implementation tourism management planning.

In this study, we used the third edition of the Commission on Sustainable Development (CSD) indicators table. The newly revised CSD indicators contain a core set of 50 indicators (United Nations, 2007). These core indicators are part of a larger set of 96 indicators of sustainable development.

Some of indicators were not easily available for the Qeshm Geopark; therefore, we selected the indicators which were related to tourism and the geopark. Consequently, we selected 25 indicators focusing on social, environmental, and economical indexes (Table 5.1.1).

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Poverty	**Income poverty**	Proportion of population living below national poverty line	Proportion of population below $1 a day	0.6 % of rural population are below international poverty line ($1 a day per person) (2005) (Asr Iran, 2009) 11% of rural population in Iran are below national poverty line (2005) (Asr Iran, 2009)
	Sanitation	Proportion of population using an improved sanitation facility	—	There is no sewerage system in the villages located around the Qeshm Geopark; they use ab-sorbing wells
	Drinking water	Proportion of population using an improved water source	—	There are no water public stand pipes or piped connections to houses of villages around the geopark; locals should buy wa-ter from Qeshm city. Qeshm free zone area tries to run a water distillation system for villages.
Poverty	**Access to energy**	Share of house-holds without elec-tricity or other modern energy services	Percentage of population using solid fuels for cooking	All villages are equipped with electricity but there are no pub-lic gas stand pipes in villages; so locals buy cylinder gas for cooking. Locals do not usually use solid fuels for cooking and only below 1% of locals use solid fuels for cooking.

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark (cont.)

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Governance	**Crime**	Number of international homicides per 100,000 population	—	Till now there has not been international homicide in Qeshm Island
Health	**Mortality**	Under-five mortality rate	—	20.3% per 1000 birth (Health and Medical education centre, 2006)
		Life expectancy at birth	Healthy life expectancy at birth	70 (U.S. Census Bureau, International database,2011)
	Health care delivery	Percentage of population with access to primary health care facilities	Contraceptive prevalence rate	There are 19 villages around the geopark, 8 of which have no health centre. 16% of the population living around the geopark has to go to neighbouring villages for access to health centres.
Education	**Literacy**	Adult literacy rate	—	Year :2006 Geopark population: 17355 Literacy population: 11877
Demographics	**Population**	Population growth ratio	—	In 2007, the population growth was 2% and in 2006 it was 2.15%
	Tourism	—	Ratio of local residents to tourists in major tourist regions and destination	Year = 2006 Qeshm population : 105335 Geopark Population: 17355 Tourist population :22305 Ratio in Qeshm Island: 0.21 Ratio in Qeshm Geopark: 1.28
Natural hazards	**Vulnerability to natural hazards**	Percentage of population living in hazard-prone area	—	- Drought - Red Tide - Earthquake Qeshm Island is located on the world earthquake belt; therefore, 100% of locals live in a hazard-prone area

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark (cont.)

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Natural hazards	**Disaster preparedness and response**	___	Human and economic loss due to natural disaster	On 10th September 2008 an earthquake occurred in Qeshm Island and 13 villages were destroyed (30% to 100%), 7 persons were killed and 40 persons were injured. The local governor of Qeshm announced that the economic loss from earthquake was $1209677 (Kayhan Newspaper, 2008).
Atmosphere	**Climate change**	Carbon dioxide emissions	Emissions of greenhouse gases	There is no air pollution measurement station in Qeshm Island. Because of monsoons there is no air pollution in Qeshm Island.
Land	**Land use and status**	___	Land use change Land degradation	There is no land use map for the geopark
	Desertification	___	Land affected by desertification	There is no land use map for the geopark
	Agriculture	Arable and permanent cropland area	Fertilizer use efficiency	There is no land use map for the geopark
		___	Use of agricultural pesticides	There is no land use map for the geopark
		___	Area under organic farming	There is no farm in geopark territory
	Forests	Proportion of land area covered by forest	forest trees damaged by defoliation	In Qeshm Geopark, there is 100 km^2 of mangrove forests which contain evergreen trees (*Avicennia marina*)
			Area of forest under sustainable forest management	100% of mangrove forests are under protection, Forestation is 10%
Oceans, seas and coasts	**Coastal zone**	Percentage of total population living in coastal area	___	The width of Qeshm Island at most is 30 km and the villages' elevation is 3 to 15 m, 100% of the population live in a coastal area

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark (cont.)

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Oceans, seas and coasts	**Fisheries**	Proportion of fish stocks within safe biological limits	―	In 2007, the average fish catch in Qeshm was 30,000,000 kg. It usually included Sardine (Epinephelus *diacanthus*) Silver pomfret (*Pampus argenteus*), *Euthynnus pelamis*, red lion fish (*Pterois Volitans)*, Crimson snapper (*Lutjanus erythropterus Bloch*) and Banded grunt (*Pomadasys furcatus*). Catching other aquatic animals (ornamental fishes, marine mammals, whales, dolphins, pearls and *pinctada margaritifera)* is forbidden and they are under protection
	Marine environment	Proportion of marine area protected	Marine trophic index	Across the oceans of the world, 118 species of sea mammals have been identified. 11 species including 3 species of dolphins, 6 species of whales, one species of sea hog, and one species of sea bull have been identified in the waters of the Persian Gulf. Among marine mammals, the sea bull and Hawksbill Turtles are mentioned in the CITES list (Daanehkaar ,1998)
			Area of coral reef ecosystem and percentage live cover	―
Biodiversity	**Ecosystem**	Proportion of terrestrial area protected, total and by ecological region	Management effectiveness of protected area	Qeshm Geopark: 320 km^2 mangrove forests: 100 km^2 Mangrove cultivation:10 km^2

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark (cont.)

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Biodiversity	**Ecosystem**	—	Area of selected key ecosystems	- Shibderaz coast: About 70% of the egg-laying is concentrated in a 2-km stretch of coastline immediately adjacent to Shibderaz village. The project involves reconnaissance of 15 km of coastline by the project team in order to pinpoint egg-laying turtles - mangrove forests : 100 km^2
		—	Fragmentation of habitats	Qeshm Geopark: 320 km^2 mangrove forests : 100 km^2
	Species	Change in threat status of species	Abundance of selected key species	Gazella dorcas, Sooty Falcon (*Falco concolor*), Hawksbill Turtles, Green turtles and sea bulls (*Dugong dugong*) are mentioned in the CITES list and their hunting and sale is legally forbidden
		Change in threat status of species	Abundance of invasive alien species	- Prosopis juliflora - Small Indian mongoose (Herpestes javanicus auro-punctatus) - Harmful Algae (Cochlokinium)
Economic development	**Macroeconomic performance**	Gross domestic product (GDP) per capita	—	In 2009, GDP - per capita (PPP) for Iran was $10,900 (Index mundi, 2009).
	Employment	Employment population ratio	Vulnerable employment	According to statistical center of Iran in 2008, the unemployment rate was 8.4 %
		Share of women in wage employment in the non- agriculture sector	—	In the villages of Qeshm Geopark all women are housekeepers, but the geopark with the help of UNDP, through establishing two handicrafts workrooms, creates part-time jobs for about 50 local women

Table 5.1.1- CSD Indicators related to tourism and geopark in Qeshm Geopark (cont.)

Theme	Sub-theme	Core indicator	Other indicator	Qeshm Geopark indicator
Information and com-munication technology	**Internet users per 100 population**	Fixed telephone line per 100 population	—	Among the villages located in geopark territory only Guran, Salakh, Tabl, and Doulb have fixed telephone lines ; in these villages 20 persons per 100 have a fixed telephone line; as for internet, the rate is 5 persons per 100
		Mobile cellular tele-phone subscribers per 100 population	—	15 persons per 100
Economic development (continued)	**Tourism**	Tourism contribution to GDP	—	The direct contribution of Travel & Tourism to GDP is expected to be 2.3% of total GDP in 2011 (WTTC, 2011) Travel & Tourism is expected to directly support 453,000 jobs (2.0% of total employment) in 2011
Consump-tion and production patterns	**Energy use**	Annual energy consumption: total and by main user category	Share of renewable energy source in total energy use	Annual Electrical energy con-sumption in Qeshm Island, 2006: **Industry**: 40952000 KW/hr **Trade**: 34724000 KW/hr **Road lighting**: 754000 KW/hr **Free**: 850000 KW/hr Annual fuel consumption in Qeshm Island in 2006 was 135413000 Lit. About 1% of total energy con-sumed in Qeshm Island for highway parking areas and, road lighting is solar energy (Dary-anavard, 2006).

5.1.9. SWOT Analysis of Qeshm Geopark Sites

SWOT analysis describes current conditions and tries to comprise the regional situations in terms of Strengths (internal, should be stabilized) Weaknesses (internal, should be reduced), Opportunities (external, should be used), and Threats (external, should be fought against).

Based on experienced gained from the literature review of geoparks around the world and fieldwork in Qeshm Geopark, SWOT analysis was carried out for geosites, eco-sites and cultural sites of Qeshm Geopark (Figure 5.1. 3).

A SWOT Analysis is an effective way of analysing a project's potential by identifying Strengths and Weaknesses, and examining Opportunities and Threats which may affect it. The SWOT matrices for geological, ecological, cultural, and archaeological heritage are presented in Tables (5.1.2 to 5.1.4).

In this section, the above mentioned analysis was applied to provide key guidelines for implementing a sustainable development model in Qeshm Geopark.

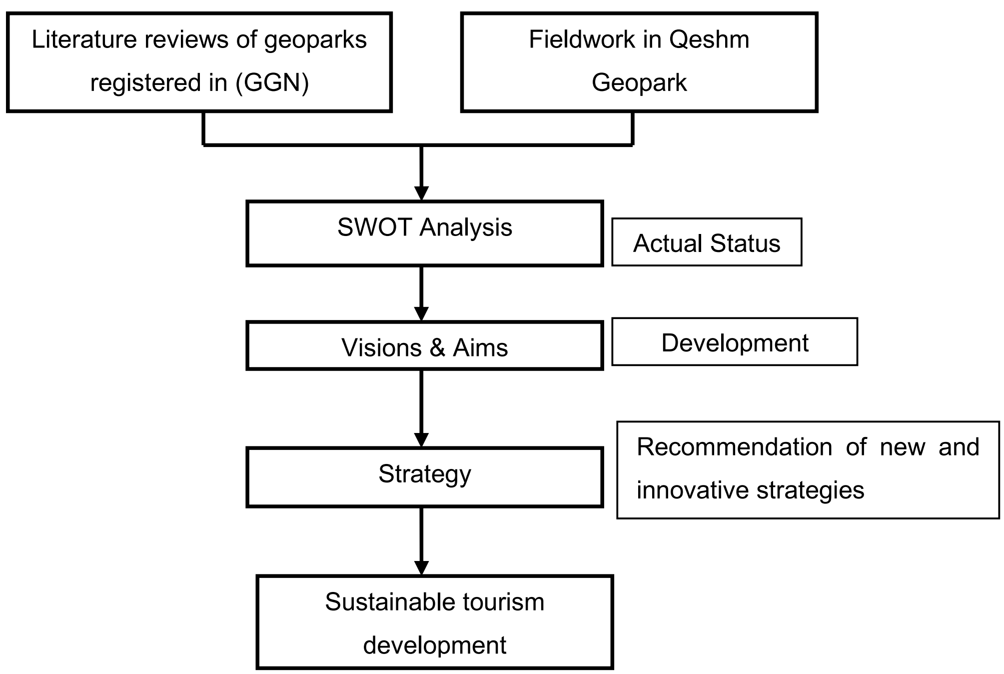


Figure 5.1.3- SWOT analysis model carried out for Qeshm Geopark,
(Source: Own construction)

Table 5.1.2- SWOT matrix for geosites of Qeshm Geopark

Strengths	Weaknesses
• Spectacular landscapes and sea-scapes • The longest salt cave in the world • Wind and water erosion features • Coastline of cliffs, sandy and rocky shore and beaches • Strolling and walking tours in geosites • Observation of stars at night in the Roof of Qeshm and The Valley of Stars site • Health therapy by Sulphurous springs • Salt cave therapy (Halotherapy) • Photo festival of geosites • Virtual tour for geoparks in Persian language • Educational program for schoolchildren of *Shahab* region	• Lack of infrastructure for water sports in coastal zone of geopark • Lack of geo-bike tours around the geopark • Shortage of brochures in live languages about geosites • Shortage of rubbish bins in seashore areas • Shortage of information about geol-ogy in geopark museum • Lack of signposts, interpretative panels in foreign languages in major-ity of sites • Lack of geo festivals • Shortage of geo-educational programs and field trips for local schoolchildren • Deficiency of geopark website in foreign languages • Shortage of local professional human resources in tourism and geology
Opportunities	**Threats**
• Providing infrastructure and facilities for halotherapy and Spa therapy in related geosites • Holding workshops and educational programs for schoolchildren in order to save themselves from dangers like earthquake • Developing and training guides, geot-ours and walk tours by geopark authori-ties • Applying solar desalination machine to produce fresh water in coastal camp-sites (there is a high potential for solar energy in geopark territory) • Holding a geopark festival for the anni-versary of Qeshm Geopark establish-ment • Making geo-products • Holding sand festivals with the geopark theme • Providing infrastructure and facilities for water sports in geopark • Providing facilities such as wood walk-ing or geo-biking near the coastal zone • Creating a salt path in geopark • Expanding involvement of private sectors in geotourism marketing • Establishing a desert museum in geopark territory • Establishing a petroleum and gas museum in geopark territory • Establishing geo-themed trail in geopark	• Natural hazards such as earthquake • Man-made hazards such as mining, and mass tourism in *Nowruz* holiday

Table 5.1.3- SWOT matrix for ecological sites of Qeshm Geopark

Strengths	Weaknesses
• Establishing scuba diving and snorkelling school • Implementing pilot conservation projects such as: sustainable development in recycling the Hawksbill Turtle hatchery with the help of indigenous people; pearl aquaculture by the local community of Berkeh Khalaf village; rehabilitation of Marine Resources of the Persian Gulf in Salakh Region; and encouraging locals to plant *Avicennia marina* in mangrove sea forest area • Publishing books and booklets about fauna and flora of Qeshm • Establishing Qeshm Geopark museum for exhibition biodiversity of geopark • Providing sea turtle watching in coastal area of Shibderaz village • Training tour guides and turtles wardens in Shibderaz village • Dolphin watching between Qeshm and Hengam Island	• Lack of environmental education, prior or during recreational boating activities around the *Harra* sea forest by guides or boatmen • Lack of footpaths or wooden boardwalk trails inside the mangrove forest for observation and walking on a bridge over the forest • Shortage of leaflets and brochures in foreign languages
Opportunities	**Threats**
• Developing bird watching in ecological sites of geopark • Developing recreational services such as: glass-bottom boats for watching aquarium and ornamental fishes in Persian Gulf • Holding geopark landscape painting exhibitions for students and kids • Creating educational tools and toys for kids which are related to geopark activities or symbols such as turtle and dolphin puzzle (Appendix 31) • Making geo-products or eco–products under the brand of Qeshm Geopark (to take an example: turtle biscuit (Appendix 32)) • Building statue of marine turtles in turtles' nesting site and inscribing the start date of the conservation project	• Natural hazards such as: climatic change (El-nino) and Red tide for coral reefs • harbour infrastructure and industrial development; for example oil pollution, ports, airfields, shrimp farming pools damage marine ecosystem significantly • Illegal human activities such as: coral reef thievery, breaking the branches of *Avicennia marina* for charcoal production and using the leaves of *Harra* for cattle fodder, and preparing souvenirs made of marine life • Human and Industrial sewage

Table 5.1.4- SWOT matrix for cultural and archaeological heritage of Qeshm Geopark

Strengths	Weaknesses
• Cooking local food • Speaking local language • Wearing local clothes (costume) • Publishing books about architecture of Qeshm • Publishing photograph albums about local culture in Qeshm • Holding local festivals in geopark villages • Establishing Qeshm Geopark museum for presenting local clothes, folk music, and handicrafts • Establishing two handicrafts (needlework) workrooms for local women in villages of geopark • Designing henna tattoos for tourists in villages of Qeshm • Organizing summer festivals for tourists • Providing a geopark calendar for events • Participation of local women in International Handicrafts Exhibition	• Shortage of local restaurants and local food in Qeshm Geopark • Shortage of brochures for historical and cultural heritage sites of geopark in live languages • Lack of cultural trails • Lack of local markets under the brand of geopark
Opportunities	**Threats**
• Rebuilding the Iranian and Portuguese castles and changing them into cultural museums • Composing a poem about Qeshm Geopark in local languages and to presenting it in open session in festivals • Integrating traditional Iranian symbols with Qeshm Geopark ecological or geological characteristics (to take an example: Turtle *Sabzeh* - *Sabzeh*: wheat, barley or lentil sprouts growing in a dish - symbolizing rebirth in *Nowruz Haft Sin* table (Appendix 33)) • Allocating one of the special boats in Qeshm (*Lenj*) as a cruise ship for travelling tourists around the Island (*Lenj* is one of the most important handicrafts in the geopark territory (Guran village)) • Converting one of the *Lenj* (special boat in Qeshm) to a beach restaurant in order to expose the Qeshm Geopark's handicraft to the public	• Natural hazards such as earthquake may destroy historical buildings • Mass and unsustainable tourism can change the customs and traditional culture of local communities

5.1.10. Summary and Conclusions

Bearing in mind that in the previous chapter geoparks were classified into six categories, therefore, in view of the fact that salt diapirs and salt caves, which are rare and unique phenomena in the world, had a high degree of importance in creation of Qeshm Geopark and development of geotourism in this region, Qeshm Geopark, can be classified in group E (cave or karst tourism).

It is worth mentioning that the longest salt cave in the world is located in Qeshm Geopark territory but the results of field trips around the geopark and SWOT matrices as a comparison model indicate that there are not enough tourist facilities in 3 Namakdan Salt Cave.

Furthermore, the results of the Sustainable Development (CSD) indicators table illustrate that Qeshm Geopark is a sensitive environmental ecosystem with critically endangered species; moreover, natural hazards such as earthquake, drought, and Red Tide threaten this area.

Apart from environmental indicators, water supply and unemployment are social problems in the villages located in surrounding of the Qeshm Geopark. It is worth mentioning that there is enough bottled water for tourists and visitors in hotels, restaurants and supermarkets.

Besides, the statistical references indicate that crime rate is low in this area and Qeshm Geopark is a safe tourism destination.

In addition, the SWOT matrices make it clear that there are some weaknesses and threats that affect the geopark. In 2010, UNESCO issued a Yellow card for Qeshm Geopark; the management plan of the Qeshm Geopark was recently submitted to UNESCO and when the plan is implemented some weaknesses tend to be overcome. The suggestions which are illustrated in the opportunities section of SWOT matrices can be supportive strategies for a better management of Qeshm Geopark.

The next part will focus on findings and results of questionnaires at local level. Since the topic is new and the geopark activities haven't been thoroughly studied yet, results of analysing questionnaires from geoparks around the world and the local communities of Qeshm Geopark can not only discover innovative strategies in geoparks but also can evaluate the role of geoparks in rural development.

CHAPTER 5- Sustainable Tourism in Qeshm Geopark (Iran)

Part 2- Findings of the Empirical Study at Local Level (Case Study)

5.2.1. Profile of the Qeshm Geopark

5.2.1.1. Introduction

In this study, Qeshm Geopark, which is located in the south of Iran, in the Persian Gulf, was selected as the case study. As mentioned in Chapter 5 part 1, UNESCO has issued a yellow card for Qeshm Geopark in 2010; therefore, this geopark has limited time to change the future of the geopark. If the geopark authorities can succeed in solving Qeshm Geopark's weakness problems, the geopark will stay as a GGN member.

The aim of this section is to identify policies and new strategies (innovation) pursued by the local government of Qeshm Geopark in achieving the goals of local development. Regarding this, two specific objectives were designed as follow:

- To engage local communities in geotourism and geopark activities
- To evaluate the role played by tourism in achieving better quality of life for local populations and stimulating economic growth

Data for this part of study were obtained from a questionnaire which was designed for the local communities of Qeshm Geopark (19 villages). Interviews in face-to-face format were conducted from July to August 2009. 720 (8% of population) questionnaire forms were collected after they had been filled in by the chosen respondents (local people) living in 19 surrounding villages of Qeshm Geopark. Data were analysed using the SPSS software and profiled by frequencies, Pearson Chi-Square test, Mean-One Sample T test, and Independent Samples Test.

This chapter starts with sociocultural impacts of tourism in Qeshm Geopark, followed by socioeconomic impacts of the creation of Qeshm Geopark, socio-environmental impacts of Qeshm Geopark in rural areas, educational activities in this territory, and ends with innovative activities in Qeshm Geopark and a conclusion.

5.2.1.2. Socio-Demographic Characteristics of the Local Communities

Questionnaires were administered in nineteen villages located in the Qeshm Geopark territory. As shown in Table 5.2.1, the majority of responses were obtained in Tabl village (18.1%), many were also collected in other villages (like Giyahdan (13.5 %), Shibderaz, and Salakh (both 8.2%), Sar Rig (7.9 %) and Berke Khalaf (7.6%).

Table 5.2.1 - Villages located in the Qeshm Geopark territory where the questionnaire was administered

No	Village	Frequency	Percent
1	Berke Khalaf	55	7.6
2	Chahu Gharbi	17	2.4
3	Chahu Sharghi	40	5.6
4	Darkooh	17	2.4
5	Doorbani	20	2.8
6	Dulab	43	6.0
7	Gambran	17	2.4
8	Giyahdan	97	13.5
9	Guran	47	6.5
10	Guri	19	2.6
11	Kani	10	1.4
12	Konar Siah	11	1.5
13	Maleki	7	1.0
14	Moradi	10	1.4
15	Salakh	59	8.2
16	Sar Rig	57	7.9
17	Shibderaz	59	8.2
18	Tabl	130	18.1
19	Tomgas	5	.7
Total	**-**	**720**	**100.0**

The majority of the respondents were male (56.5%) (Table 5.2.2). The sample presented a high diversity of ages and the majority (52.8%) of local communities who replied to questionnaires were classified between the ages of 20 and 36 years.

Table 5.2.2 - Socio-demographic characteristics of the local communities

Socio-demographic profile		Frequency	Percent
Gender	Female	313	43.5
	Male	407	56.5
Age	20-36	380	52.8
	36-52	247	34.3
	52-68	77	10.7
	68-84	16	2.2
Education	illiterate	27	3.8
	Read and write	71	9.9
	Primary school	116	16.1
	Guidance school	247	34.3
	High school	177	24.6
	University	82	11.4
Activity	Industry	36	5.0
	Agriculture, Fishing and Forestry	209	29.0
	Tourism	44	6.1
	Education	15	2.1
	Business	115	16.0
	souvenir shop or needlework	98	13.6
	Other	86	11.9
	Unemployed	117	16.3

The sample shows that the majority of local communities are involved in activities such as fishing (29%) and business (16%). Our results also illustrated that unemployment is a socioeconomic problem in the local communities of the surrounding villages of the Qeshm Geopark. It is worth mentioning that the unemployment rate of females (n= 112) in rural areas of the geopark territory is much higher than the males.

5.2.1. 3. Sociocultural Impacts of Tourism in the Qeshm Geopark

Nowadays, the urbanization rate has increased and in urban communities, traditional patterns are not efficient within this lifestyle. In Iran, as in other countries, urbanization has increased, while Qeshm Island is one of the Iranian societies where its traditional culture and lifestyle are interweaved and it was a key component for UNESCO to establish the first Iranian and Middle East Geopark in this Island.

Zamani-Farahani and Henderson (2010) noted that in societies such as Iran and Saudi Arabia where religion and politics are interweaved; development of tourism is not the same as other countries. In these countries Islam is all pervasive in societies and Sharia law may govern much of what is considered acceptable (Halal) regarding leisure. Laws prohibit public displays of affection, shaking hands or any physical contact between members of the opposite sex, unmarried couples sharing rooms, gambling, breaking fast in daylight during Ramadan, consumption of pork and other forbidden food, selling or drinking liquor and dressing inappropriately. Both sexes must cover their torso and upper legs at all times and only women's faces may be exposed (Deng *et al.*, 1994). Frequenting discotheques and bars and miscellaneous other entertainments are deemed unlawful. Men and women may be segregated at events and sites such as pools and beach.

It seems that a state religion can be a serious barrier for the development of tourism marketing, but the verses of the Quran cited below from the chapters named in brackets endorse travelling with a view to achieving spiritual, physical and social goals. Al-Imran (The Amramites): 137; Al-An'am (Livestock): 11; Al-Nahl (The Bee): 36; Al-Naml (The Ant): 69; Al-'Ankaboot (The Spider): 20; Al-Room (The Romans): 42/9; Saba' (Sheba): 18; Yousuf (Joseph): 109; Al-Hajj (The Pilgrimage): 46; Faater (Initiator): 44; Ghafer (Forgiver): 82/21; Muhammad: 10; Younus (Jonah): 22; and Al-Mulk (Kingship): 15' (Pickthall, 1976; Yusuf Ali, 2005). The lessons are that more complete submission to God is possible through seeing the beauty and bounty of His creation. Travel can enhance health and well being, reducing stress and enabling Muslims to know God better (Zamani-Farahani and Henderson, 2010). Moreover, Hajj to Mecca is one of the principles of Islam, requiring Muslims to make the journey at least once in their lifetime unless prevented by physical incapacity (Rowley, 1997).

To have sustainable tourism development in Iran, it is crucial that the local socio-political and cultural context is never underestimated. Iran as a Muslim country has strict codes of social contact and some traditional and religious prohibitions that should be respected (Faghri, 2008).

To this end, tourists should be informed about local customs, acceptable social behaviours, etc. by means of advertisement. Visitors can be educated through introducing local cultural values, providing cultural guidelines, and presenting briefings about appropriate behaviour.

Moreover, in Iran there are many local accents, local dialects and languages (Persian, Turkey, Kurdish, Armenian, and Arabic etc.) and the people who live in those territories have particular traditional clothes and folk music.

Thus, for development of tourism marketing in Iran not only the international tourists should not violate to the host customs but also the domestic tourists should respect traditional culture. Since, geotourism can be the best practice tourism that sustains, or even enhances, the geographical character of a place, such as its culture, environment, heritage, and the well-being of its residents and owing to religious and cultural barriers, Iran should pay particular attention to the development and promotion of geotourism as a branch of sustainable tourism in its tourism strategy.

This section emphasises the role of the establishment of the Qeshm Geopark on the minimization of the negative sociocultural impacts of tourism in rural areas. Accordingly, the following hypothesis was built to examine this role of the Qeshm Geopark.

- H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by local communities
    - sub-hypothesis: Men more than the women, who live in the surrounding villages of the Qeshm Geopark, think that tourism has a negative social impact on their community

A brief description of cultural components in the surrounding villages of the Qeshm Geopark helps us to gain a better understanding of local customs and traditions in this territory. The official language in Qeshm is Persian but the local people speak the Pahlavi dialect, as a branch of the primary Persian language. Qeshm is a free trade Island and its economy is heavily dependent on trade and such economic activities between local communities of the island, Arabic countries and India are aided by the local people of Qeshm learning Arabic and Indian languages.

The majority of people who live in Qeshm are Muslims but they are Sunni, so they are classified as a religious minority in Iran. Very few Christians and Zoroastrians live in this area as well.

Qeshm Island is a very strict traditional region; local people wear traditional clothes and the local women use henna tattoo designs in marriage celebrations. Traditional clothing is a tourist attraction in this Island; the women of Qeshm wear beautiful and colourful traditional clothes. When they venture out into public, they use a special cover, which is called “Bourke”, designed in different sizes. Some are big and wide enough to cover the whole face and have only two holes over the eyes. Others are narrow and they only cover part of the eyes and eyebrows. In addition, ladies cover their heads with a thin cloth, called “Jelopol”, on which they wear a chador or veil. Their blouses are also special. Trousers are interesting as well; they are made of thick cloth. The upper parts of the pants are loose and the bottom part is tight.

The men, like other southern parts of the country, wear a long, white or colourful shirt, locally called “Jimeh”. The long shirt covers them from shoulder to ankle. They are free to let you move around and it is suitable for the southern parts because the weather in the south of Iran is warm and humid. Some people wear a hat with holes in it called “Aragh-chin”.

The local ladies of Qeshm cook a variety of food with fish, shrimp, crab, oyster, meat, dates, flour, oil, sugar, cereal, and rice. We can name fish kebab, Kolomba, Zebon, Moflak, Haware, Ankas, Dishow, Poodane, Motabak, Katog-hala, Malook, Palshk, Matoota, Momaga, and Singow as local food on the island.

The above mentioned factors indicate which people are compatible with local customs in this territory; therefore, for developing tourism, officials should pay particular attention to sociocultural impacts of tourism on the local community.

In this regard, a questionnaire was designed for the purpose of achieving the research objectives. The questions in the questionnaire were chosen according to the main criteria that should be considered when one tries to measure the impact of the development of tourism and its effect on the standard of living of local people as it is extracted from tourism studies and leisure literature. There were 720 questionnaire forms that were recollected after they had been filled in by the chosen respondents in the Qeshm Geopark.

Descriptive statistic analysis was used to measure the sociocultural impact of the development of tourism on the local community of the geopark.

Based on the results, local people have positive attitudes towards the development of tourism in the geopark, and 91.9% of respondents were open to accepting an expansion of tourist marketing in their area. But they (54.9%) believe that there are some negative sociocultural impacts of the development of tourism on local communities in Qeshm Geopark (Table 5.2.3). Respondents mentioned the following negative sociocultural impacts on Qeshm Geopark though the development of tourism:

- Demise of the local language
- Increase in inflation rate

- Vanishing local customs and traditional way of life, with local clothes taken as an example (Appendix 40)
- Increased tendency towards urban lifestyle
- Propagation of unveiling
- Vanishing religious customs

Table 5.2.3 - Descriptive analysis of negative sociocultural impact of development of tourism in Qeshm Geopark

Variable	Yes	No	I do not know
	Percent		
Tourism has a negative impact on the town/village socially	54.9	37.4	7.8

The result of the chi-square test (Sig. (2-sided) = .000) illustrates that there is a relation between two variables (gender and negative impact of tourism on the town/village socially). These results indicate that the majority of men (62.9%), more than women, who live in the surrounding villages of the Qeshm Geopark, think that tourism has a negative impact on their community (Table 5.2.4, 5.2.5).

Aside from the negative sociocultural impacts of tourism in this area, locals of the geopark introduced some positive socioeconomic impacts of tourism which appeared through geopark activities in this area such as local festivals, seafood festivals, supplementary income, cultural exchange, establishing two handicraft workrooms for women (needlework), seasonal and part time job opportunities and entrepreneurship, especially for women.

According to the field observation around the rural areas of Qeshm Geopark, plus results from questionnaires filled by officials and interviews with the manager of the geopark, there are strategies which Qeshm Geopark, under the supervision of Qeshm Island Free Zone organization with the help of UNDP (United Nations Development Programme) office in Tehran, Avaye Tabiat Company and Environment Department, have applied for cultural sustainability: establishing the Geopark museums, which include a collection of local clothes, artefacts and local musical instruments; publishing books about architecture of

Qeshm (especially Laft village), and some photograph albums about local culture in Qeshm; organizing workshops to design henna tattoos for tourists in villages of Qeshm Geopark; holding summer festivals and regional festivals (such as Nowruz Sayyad and sea food as explained in chapter 5 part 1); and participation of local women in National and International handicrafts exhibitions and fairs.

It is worth mentioning that designing a geopark calendar for events of Qeshm Geopark by the author of this thesis was another strategy for the preservation of cultural components in this territory (Appendix 41).

Consequently, the establishment of Qeshm Geopark can be a gateway for cultural sustainability in rural areas of Qeshm Geopark.

Table 5.2.4 - Descriptive analysis (Crosstabs) of negative sociocultural impacts of development of tourism variables in Qeshm Geopark

			Negative sociocultural impacts on local community			Total
			Yes	No	I do not know	
Sex	Female	Count	139	140	34	313
		Expected Count	171.7	116.9	24.3	313.0
		% within Sex	44.4%	44.7%	10.9%	100.0%
		% of Total	19.3%	19.4%	4.7%	43.5%
		Adjusted Residual	-4.9	3.6	2.7	
	Male	Count	256	129	22	407
		Expected Count	223.3	152.1	31.7	407.0
		% within Sex	62.9%	31.7%	5.4%	100.0%
		% of Total	35.6%	17.9%	3.1%	56.5%
		Adjusted Residual	4.9	-3.6	-2.7	
Total		Count	395	269	56	720
		Expected Count	395.0	269.0	56.0	720.0
		% within Sex	54.9%	37.4%	7.8%	100.0%
		% of Total	54.9%	37.4%	7.8%	100.0%

Table 5.2.5 -Chi- Square test of negative sociocultural impacts of development of tourism variables in Qeshm Geopark

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.845[a]	2	.000
Likelihood Ratio	25.915	2	.000
Linear-by-Linear Association	25.037	1	.000
N of Valid Cases	720		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.34.

5.2.1.4. Socioeconomic Impacts of the Establishment of Qeshm Geopark

The purpose of this section is to investigate the effects of the establishment of Qeshm Geopark on development of the local economy through geotourism and involvement of local communities in geopark activities. This part also presents a summary of work being carried out in Qeshm Geopark for entrepreneurship, creation of new supplementary income and job opportunities in rural areas.

Regarding this, the following hypotheses were built and tested:

- H3: Geotourism activities in geoparks create opportunities for local development
- H4: Using geotourism can be a useful strategy for developing tourism in geoparks
- H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories
    - $H_{Null=}$ Salary of local communities involved in geopark activities is equivalent to National Minimum Wage (NMW) rate (per month): M1=207 € (2009)
    - **First sub-hypothesis for H7:** Salary of local communities involved in geopark activities is not equivalent to National Minimum Wage (NMW) rate (per month): M1≠207 € (2009)
    - H_{Null}= Men and women earn equal revenue from geopark activities: M Men = M Women
    - **Second sub-hypothesis for H7**: Men earn more revenue from geopark activities: M Men ≠ M Women

Results of statistical analyses of questionnaires are shown in Table 5.2.6.; Results indicate that unemployment is a socioeconomic problem in the surrounding villages of Qeshm Geopark. As Qeshm is a free trade Island and is located in Persian Gulf, the local economy of this area is heavily dependent on fishery and business activity. Therefore, many passengers with a view to trade travel to this island annually. It is evident that, because of the climate limitations tourists prefer to travel to Qeshm from October to April. Thus, seasonal unemployment and mass tourism are consequences of the climatic conditions on this Island.

The majority (82.8%) of responders (local communities living in the surrounding villages of Qeshm Geopark) believe that geotourism has a positive impact on the local economy and 91.9% of them desire to see an expansion of tourism marketing in Qeshm Geopark. Thus, most respondents welcomed the Qeshm Geopark concept and were happy to be part of the geopark.

Since 2001, officials of the environment department and Qeshm Island free zone organization with the help of UNDP (United Nations Development Programme) have tried to involve local communities in conservation activities and tourism marketing. This strategy has not only reduced unemployment and provided supplementary income for locals but has also helped the local government impart indigenous knowledge.

Beside this, Qeshm free zone organization, with the purpose of sustainable development, has proceeded to identify, register, and maintain the natural, geological, historical, and cultural heritage on Qeshm Island. Finally, Qeshm Geopark was registered in the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2006; establishing Qeshm Geopark was expedient in attracting tourists to this area.

Table 5.2.6 - Frequency distribution of questions related to economy in Qeshm Geopark

Questions	Frequency	Percent	Cumulative Percent
local community depends on a single industry			
1. Yes	387	53.8	53.8
2. No	225	31.2	85.0
3. I don't know/no answer	108	15	100.0
Unemployment is a problem in your local community			
1. Yes	611	84.9	84.9
2. No	70	9.7	94.6
3. I don't know/no answer	39	5.4	100.0
The level of unemployment is seasonal			
1. Yes	483	67.1	67.1
2. No	170	23.6	90.7
3. I don't know/no answer	67	9.3	100.0
Geotourism has a positive impact on the local economy			
1. Yes	596	82.8	82.8
2. No	44	6.1	88.9
3. I don't know/no answer	65	9.0	97.9
4. Both	15	2.1	100.0
You desire to see an expansion of the tourist industry in your area			
1. Yes	662	91.9	91.9
2. No	44	6.1	98.1
3. I don't know/no answer	14	1.9	100.0
There are some socio-economic benefits resulting from a geopark in your area			
1. Yes	364	50.6	50.6
2. No	79	11.0	61.5
3. I don't know/no answer	277	38.5	100.0

It is noteworthy that the geopark is a new concept in Iran and most of the people living in Qeshm Geopark territory are not familiar with term geopark or its targets. However, the majority (50.6%) of responders recognize the geopark as an opportunity for socioeconomic development in their area, particularly those involved in tourism-based activities, i.e. boatmen, family guest houses owners, tour guides and souvenir shop owners.

Samples illustrate that Qeshm Geopark only benefits locals in 5 villages among 19 villages located in the geopark territory. Qeshm Geopark authorities attempt to create new job opportunities and up to now they have succeeded in providing some seasonal and part-time jobs for the local people of these villages (Berke khalaf, Shibderaz, Tabl, Salakh, and Chahu Sharghi) (Figure 5.2.1).

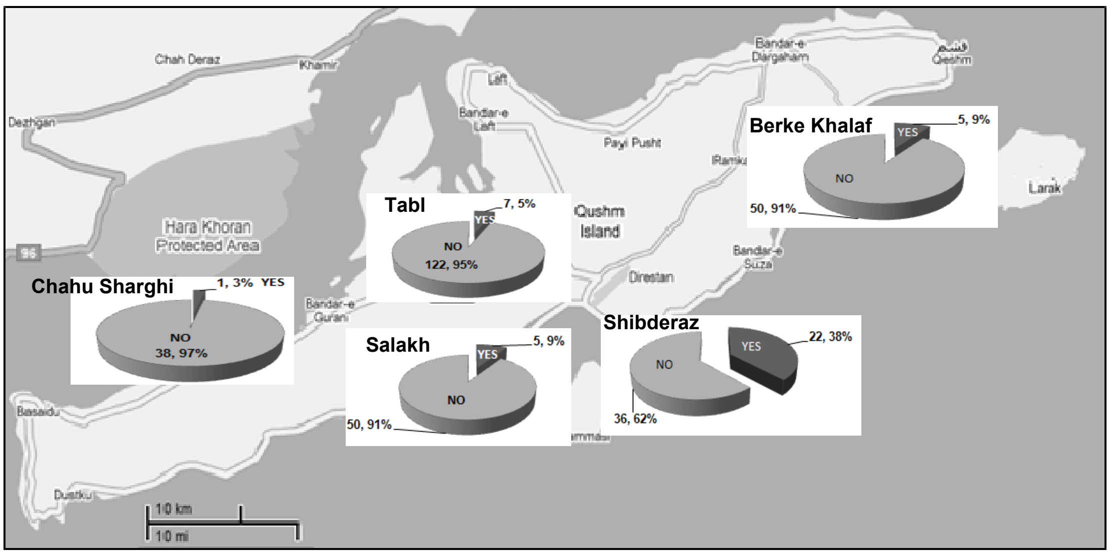


Figure 5.2.1- Development of local economy in 5 villages of Qeshm Geopark,
(Farsani *et al*., 2011c)

Shibderaz with 38% (Table 5.2.7) of locals involved in tourism and conservation activities is a pioneer in local development. Managing family guest houses, organizing tour leaders for wildlife watching (especially marine turtles), providing turtle watching tours, acting as guards, and selling souvenirs are job opportunities and jobs associated with tourism which appeared through creation of the geopark and development of geotourism in this village.

Moreover, in spring which is the season of nesting and laying eggs of Hawksbill Turtles locals of Shibderaz cooperate in collecting and protecting eggs and finally, they return the baby turtles to their natural habitat into the Persian Gulf. Meanwhile, this conservation activity not only preserves the marine turtles, but also provides supplementary income and seasonal jobs for local people of the Shibderaz.

Creating part time jobs for women is another geopark enterprise in Shibderaz and Berke khalaf village. Geopark officials with the help of UNDP/SGP established two handicraft workrooms (needlework) in these villages but the local women of Shibderaz requested the establishment of a fixed souvenir shop in the village.

Organizing mangrove tours around the mangrove sea forest in small boats in Tabl village and establishing a family guest house in this village are other geopark enterprises. The statistical analyses of samples indicate that these activities create 5% of job opportunities in this site of Qeshm Geopark (Table 5.2.7).

In addition, holding regional festivals and seafood festivals in rural areas such as Salakh village is another strategy to attract tourists to these rural areas.

It is worth mentioning that working as guards for geological sites and guides in the geopark museum are other full time jobs which directly emerge through geopark activities. Aside from direct job opportunities, geopark and geotourism development embrace indirect activities associated with tourism such as accommodation, local transportation, local restaurants, and services.

Table 5.2.7- Percentage of local people who are involved in Qeshm Geopark activities

No	Village	Are you employed in the geopark or involved in geopark activities?	
		Yes	No
1	Berke khalaf	9%	91%
2	Chahu Gharbi	-	-
3	Chahu Sharghi	3%	97%
4	Darkuh	-	-
5	Dulab	-	-
6	Durbani	-	-
7	Gambran	-	-
8	Guran	-	-
9	Guri	-	-
10	Gyiahdan	-	-
11	Kani	-	-
12	Konar siyah	-	-
13	Maleki	-	-
14	Moradi	-	-
15	Salakh	2%	98%
16	Sar Rig	-	-
17	Shibderaz	38%	62%
18	Tabl	5%	95%
19	Tomgas	-	-

Question number thirteen (Q13: How much is your salary from involvement in geopark activities? - Per month) was designed to test the following sub- hypothesis.

- H_{Null}= Salary of local communities involved in geopark activities is equivalent to National Minimum Wage (NMW) rate (per month): M1=207 € (2009)

- **First sub-hypothesis for H7:** Salary of local communities involved in geopark activities is not equivalent to National Minimum Wage (NMW) rate (per month): $M1 \neq 207$ € (2009)

228 respondents replied to this question (Table 5.2.8). Since the government determined National Minimum Wage rate in rural areas as equivalent to 207 € per month in 2009, the test value is therefore 207 €. The data was analysed using a one-sample t-test which compares the mean score of a sample to a known value.

Based on the result of the test, the monthly revenue of local communities involved in Qeshm Geopark activities is less than 207 € (Table 5.2.9) Thus, it can be said that the null hypothesis is rejected and the first sub-hypothesis is confirmed.

Table 5.2.8 - Descriptive analyses related to Q13
(If you are employed in the geopark, how much is your salary?)

Monthly Revenue		Frequency	Percent
	50-100	62	8.6
	100-150	108	15.0
	150-200	21	2.9
	200-250	36	5.0
	volunteer	1	.1
	Total	**228**	31.7
Missing	System	492	68.3
Total		720	100.0

Table 5.2.9 - Results of One-Sample T-Test analysis for question 13
(If you are employed in the geopark, how much is your salary?)

One-Sample Statistics

N	Mean	Std. Deviation	Std. Error Mean
228	2.15	1.023	.068

One-Sample Test

Test Value = 207					
				95% Confidence Interval of the Difference	
t	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
-3023.158	227	.000	-204.846	-204.98	-204.71

M-207<0-→ M<207

Bear in mind that 228 respondents (N= 228 persons) replied to this question. We draw attention to the fact that the majority of local communities are involved in geopark activities in the form of seasonal (n=127 persons) or part-time (n= 86 persons) work.

According to field trip observation around Qeshm Geopark, some local women in rural areas of Qeshm Geopark are engaged in handicraft workrooms, room rentals, and activities such as designing henna tattoos for visitors, and doing aquaculture of pearls, while the local men are employed as boatman around the *Harra* sea forest, marine turtle watching guides, marine turtle guards, geosite surveillance, etc.

The independent samples t-test (Table 5.2.10) was used to test the second sub-hypothesis of the seventh hypothesis.

- H_{Null}= Men and women earn equal revenue from the geopark activities: M Men = M Women (2009)
- **Second sub-hypothesis for H7**: Men earn more revenue from geopark activities: M Men ≠ M Women (2009)

The results indicated that the wages of the local men from geopark activity is more than the local women. Therefore, the null hypothesis is rejected and the results of the independent samples t- test can help to confirm the second sub- hypothesis.

Consequently, authorities of Qeshm Geopark try to encourage local communities to participate in geopark activities, particularly conservation activities and tourism in the form of geotourism and ecotourism. Involving local in these kinds of activities can create some job opportunities for them. But results illustrated that the majority of these job opportunities are in the form of part-time and seasonal work. Thus, it can be said that the establishment of Qeshm Geopark can help to create supplementary income for locals who live in rural areas of Qeshm Geopark. However, Qeshm Geopark is an early stage of its activity and they concentrate only on 5 villages among 19 villages located in the geopark territory. It is worth mentioning that some villages such as Shibderaz village and Berke khalaf village which are active in development of geotourism, are known as geopark sites but are located outside the Qeshm Geopark border and we suggest that for submitting a new application dossier to UNESCO, authorities should change the border of the geopark territory.

Table 5.2.10 - the results of applying Independent Samples T-Test for question 13

(If you are employed in the geopark, how much is your salary?)

Group Statistics

Sex	N	Mean	Std. Deviation	Std. Error Mean
Female	85	1.36	.633	.069
Male	143	2.62	.918	.077

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	28.921	.000	-11.150	226	.000	-1.258	.113	-1.480	-1.035
Equal variances not assumed			-12.210	220.942	.000	-1.258	.103	-1.461	-1.055

M1= the wage of women from geopark activity

M2= the wage of men from geopark activity $M1-M2<0 \rightarrow M1<M2$

5.2.1. 5. Socio-Environmental Impacts of the Establishment of Qeshm Geopark

As mentioned in the literature review chapter, conservation of geological and natural heritage is one of the triple targets of the establishment of geosites and geoparks.

The primary purpose of this section is to identify the effect of the establishment of Qeshm Geopark on preservation of natural resources and landscapes. Regarding this I present a summary of work being carried out in geopark territory. We also designed three questions in order to test the following hypotheses:

- H1: Geoparks involve local communities in conservation activities
- H2: Geoparks have positive socio-environmental impacts on local communities

The development of tourism marketing may have a negative impact on the local environment and landscape of rural areas located in Qeshm Geopark territory. As illustrated in Table 5.2.11, the first question investigates whether the local community believe that tourism marketing has a negative impact on their environment or not. The second question inquires which local organisation or community encourages local communities to protect natural (geo and bio) heritage. In addition, the third question evaluates the environmental benefits resulting from the establishment of Qeshm Geopark in rural areas. The samples (720 questionnaires) were analysed by the descriptive analysis method via SPSS tool.

Table 5.2.11- Descriptive analysis of questions related to socio-environmental negative impact of development of tourism in Qeshm Geopark

Question	Yes	No	I do not know
	Percent		
tourism has a negative impact on the local environment	51.0	38.5	10.6
there is a community-based approach to conservation being applied to your area to encourage protection of the natural area	55.0	19.2	25.8
There are some environmental benefits resulting from a geopark in your area	54.4	13.3	32.2

Results illustrate that the majority of local people (51%) believe that tourism has a negative impacts on their local environment. Respondents mentioned the following negative impacts affected the Qeshm Geopark though development of tourism:

- Producing solid waste in coastal areas
- A negative impact on the landscape especially in Spring (tourism season picks up) such as camping
- Producing noise pollution
- Moving lights (torch lights and other illumination used by tourists) scares nesting turtles
- Breaking off stalactites by tourists as souvenirs in *Namakdan* Salt Caves
- Writing mementos on the stones of *Chahkooh* site
- Reducing fresh water
- Using camera flash by tourists in turtle sites (flash photography of nesting turtles is illegal in some places)

It is noteworthy that the majority of respondents (54.4%) introduced some environmental benefits in their territory that appeared through establishment of Qeshm Geopark. For instance, installing rubbish-bins and signposts in villages, involving locals in conservation activities and tourism marketing (local guardians for preserving turtles, collecting rubbish in coastal areas, local tour guides for turtle watching and plant propagation) are enterprises which not only create seasonal job opportunities and supplementary income for indigenous people but also preserve the landscape and environment.

Consequently, it is evident that the establishment of Qeshm Geopark can help to minimize the negative environmental impacts. And also the results can help to confirm the first and the second hypotheses.

According to responses and field trip observations, the Qeshm free zone organization, the environment department, the office of tourism deputy, geopark, the UNDP office in Tehran, NGOs, and private sectors such as the Avaye Tabiat Company try to involve local communities in geopark conservation activities. But results indicate that significant numbers (45%) of locals have no information about the above mentioned activities such as the new terms of ‘geopark’ and ‘geotourism’; a lack of comprehensive educational programs has also made the local people of Qeshm Geopark unaware of geopark activities and its targets.

Thereby, education as a geopark target plays an important role in awareness of locals. In the next section I concentrate on educational activities in the Qeshm Geopark.

5.2.1.6. Educational Activities in Qeshm Geopark

Existing geoparks organize a whole spectrum of educational activities for both visitors and local adults and schoolchildren. This section discusses the educational activities in the Qeshm Geopark, and also tries to test the following hypothesis:

- H7: Geoparks contribute to increasing the geological knowledge and employment of local communities in rural areas and geopark territories

The purpose of this section is to explore local community understanding of Qeshm Geopark and its meaning to their everyday lives. 67% of respondents said they had no understanding of the geopark concept and its activities (Figure 5.2.2). These local respondents could not relate the geopark concept to their everyday lives.

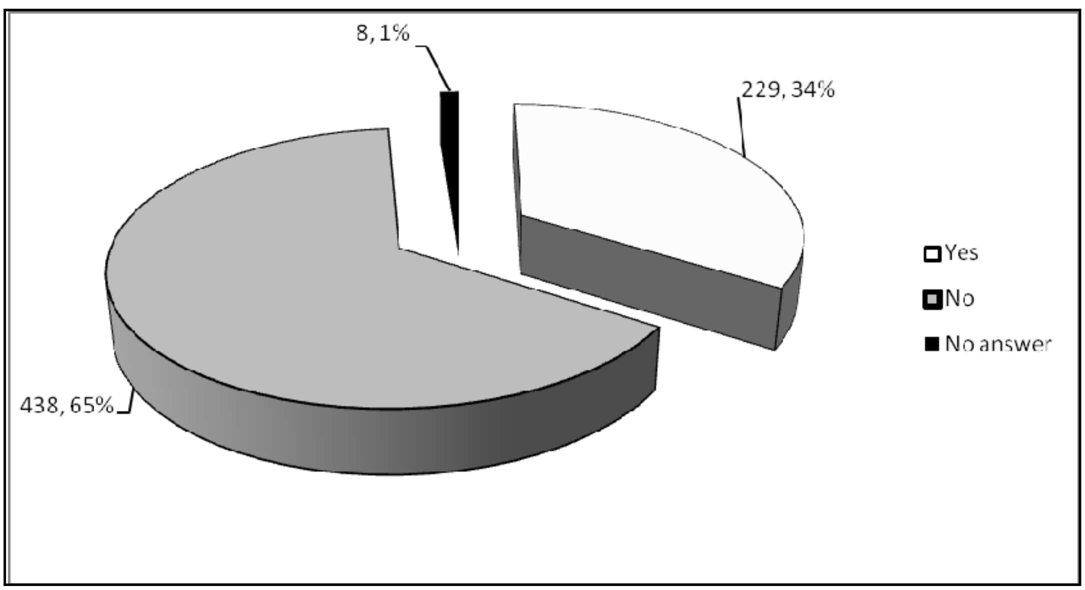


Figure 5.2.2: Percentage of respondents to the question

(Do you know what a geopark is?)

Based on the results of analyses, the majority (75%) of the local respondents know that Qeshm is a geopark (Figure 5.2.3). But when asked what first came to their mind about the meaning of geopark, most of the respondents answered ‘rocks and rock formations’. When asked to identify where the Qeshm Geopark is, most of them identified the valley of Stars – located near the Berkeh khalaf village – placed on the face of the rock landscape.

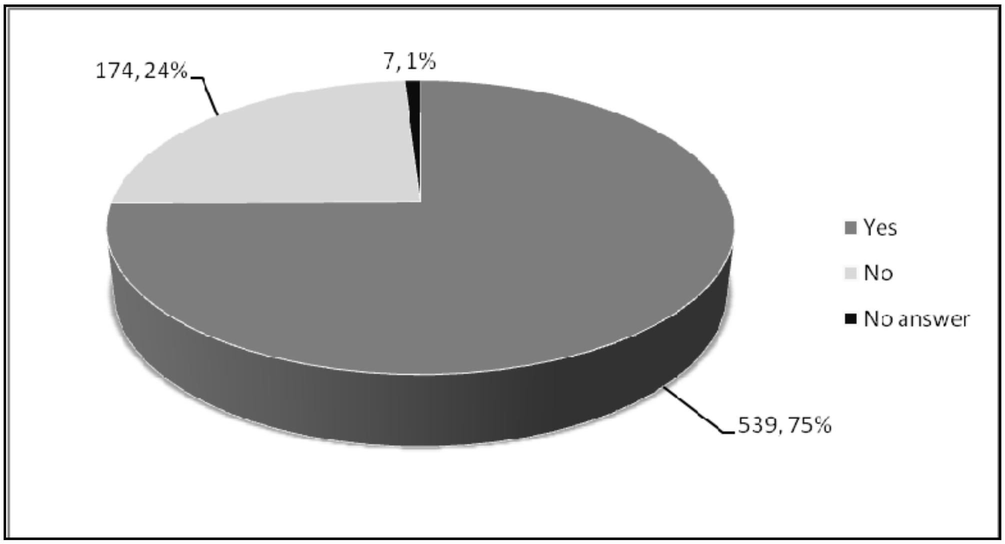


Figure 5.2.3 - Percentage of respondents to the question
(Do you know that Qeshm is a geopark?)

The results of questionnaires and literature indicate that the Qeshm Geopark (Iran) is the only geopark which has a weak operation on educational programs for local schoolchildren and local communities. Qeshm has centred all its educational activities on geopark museums and publications.

It is worth mentioning that recently authorities of Qeshm Geopark organized some meetings about cooperation between Qeshm Global Geopark and schools of *Shahab* region located in the geopark territory. Furthermore, they organized field trips and a festival titled “School Bell Ringing for Geopark” for schoolchildren.

Regarding educational activity, Qeshm Geopark Museum opened in 2005. The purpose of the museum and archives is to collect, preserve, make available for research, and exhibit documents and artefacts that will serve to illustrate the local history and culture. This includes a collection of taxidermy of native and migratory birds, creepers, mammals, fishes, and insects of Qeshm Geopark. Also fossils of corals and bivalves of the geopark are exhibited in the museum. Unfortunately, the Geopark Museum is located outside the border of the geopark.

In addition, interpretation packages are available for visitors, tourists, and researchers such as the geotourism Atlas of Qeshm, Birds Atlas of Qeshm, handbook of *Harra* community, map of Qeshm, and Qeshm geology books.

Moreover, toys based on geopark elements such as a turtle puzzle (the symbol of Shibderaz village), allocating parts of geopark museum to educational activities for kids and students, a geopark landscape painting exhibition for students and kids, fieldtrips to the geopark, sand sculpture festivals with a geopark theme in coastal areas, educational programs and field trips for teachers and earthquake manoeuvres for students and kids can be useful enterprises to increase local public knowledge about geology and the geopark.

Furthermore, adding a chapter about Qeshm Geopark and its targets in geology and geography books of primary, secondary and high schools can be a good strategy for introducing the Qeshm Geopark and its targets.

Recently, Qeshm Geopark authorities attempted to organize workshops on geopark activities for local business people and government. Moreover, authorities of Qeshm Geopark support master and PhD theses related to geopark activities.

At present workshops are not managed by local communities of geopark territory and only a few persons are involved in Qeshm Geopark museum as leaders. Thus, it can be said that Qeshm Geopark does not have the dynamic as other geoparks in the contribution to increase the geological knowledge and employment of local communities in workshops and schools.

5.2.2. Summary and Conclusions

On the basis of the results of data analyses, field trip observation and literature review in chapter 5 part 1 and chapter 2, it can be concluded that Qeshm Geopark, as the first geopark in the Middle East, can play a role in the development of geotourism marketing and local economy in rural areas of its territory. And the results support the expectations of the establishment of a geopark in rural areas.

Besides, the results of descriptive analysis in the Qeshm Geopark as a case study illustrate that the majority of local people (51%) believe that tourism has a negative impact on the local environment, but 54.4% of local respondents mentioned that creation of the geopark has some environmental benefits in their territory. For instance, installing rubbish-bins, and signposts in villages, involving locals in conservation activities, and tourism (local guardians for preserving turtles, garbage collectors in coastal areas, local tour guides for turtle watching and plant propagation are enterprises which not only provide seasonal and part-time job opportunities and supplementary income for indigenous people but also preserve the landscapes and the environment).

Responses indicate that local communities of Qeshm Geopark have positive attitudes towards development of tourism in their territory; 91.9% of respondents mentioned that they are interested in expanding the tourist industry in their area. But they believe that there are some negative sociocultural impacts of tourism development on local communities in the Qeshm Geopark such as the demise of the local language; vanishing local customs, and traditional way of life, taking as example local clothes.

Apart from negative sociocultural impacts of tourism in this area, locals of the Qeshm Geopark introduced some positive tourism socioeconomic impacts which appeared through geopark activities in this area such as regional festivals, a seafood festival, supplementary income, cultural exchange, seasonal and part-time jobs, and entrepreneurship for women. Consequently, geotourism can also contribute significantly to cultural preservation. This indicates that geoparks as pioneers in geotourism development can be considered as a sustainable base for the development of tourism.

Engaging local communities in tourism sectors such as mangrove tours, turtle sites, handicraft workrooms (needle work), and local accommodation, officials of Qeshm Geopark created second job opportunities or supplementary income for locals.

Unfortunately, Qeshm Geopark has a weak operation in educational programs for the local schoolchildren, and has concentrated its educational activities just on the geopark museum, publications, some schools and graduate student theses.

As mentioned before, in 2010, UNESCO issued a yellow card for Qeshm Geopark; therefore, authorities should solve the weakness problems of geopark. According to interviews with geopark authorities and field trips around the Qeshm Geopark territories, some of the weakness problems are pointed out as follows:

1. Weakness problem in neighbourhood boundary of Qeshm Geopark. Since the Qeshm Geopark was established in 2006, and at that time the geopark and geotourism were not studied thoroughly yet and geopark authorities were not familiar

with these new concepts, the neighbourhood boundary of Qeshm Geopark has some weaknesses. For instance, some important sites such as the Valley of Stars and the Laft village are located outside the geopark territory.

2. A weakness problem in the dossier of Qeshm Geopark. Geopark authorities should rewrite a new dossier with emphasis on geopark activities regarding the local development, conservation and education, beside the aesthetic appeals.
3. Determinants of a budget deficit in Qeshm Geopark for implementation of the geopark plan. As mentioned before, the geopark is under the supervision of Qeshm Free Zone Organization. Unfortunately the managers of this organization misunderstood geopark activity and they think that the geopark concept only includes geological heritage. Therefore, they did not support the geopark in the financial cases appropriately.
4. Lack of network activities in management of the geopark.
5. Management of Qeshm Free Zone Organization is weak from the nature conservation viewpoint. Allocation of some unique coasts and islands to petroleum companies is an example in this regard.

CHAPTER 6- Conclusions and Implications

6.1. Introduction

This thesis aims to understand the role of the establishment of geoparks in rural development. Moreover, this thesis tries to propose new tourism destination choices which would improve understanding of earth sciences such as geology, geomorphology geodiversity, and geography.

This chapter presents the major conclusions of the thesis, discusses limitations, contributions and managerial implications of the study. Specific suggestions for Qeshm Geopark are also discussed for the development and marketing of geotourism in this area.

It proceeds with recommendations that may provide suggestions for future research.

6.2. Main Conclusion

According to National geographic (2005), geotourism is a sustainable strategy. Moreover, the Lanzarote Charter for Sustainable Tourism (1995) defined 18 principles for sustainability. In recent decades, geoparks as new model of sustainable development in protected areas through geotourism strive to promote local economy especially in rural areas (UNESCO, 2006b; Zouros, 2004; Zouros, and Mckeever, 2009). Nevertheless, none of the research works have considered the novel and innovative strategies applied in geoparks for sustainable development. Innovation plays an important role for sustainable competitiveness and idea generation in research; and development is an essential part of it. However, in the present study the idea of building hypotheses and objectives raised from literature reviews.

In this study I try to introduce geoparks as an innovation in tourist destination and consider innovative strategies to improve the local economy of geoparks as environmentally sensitive areas. The main objective of the study presented in this thesis is a contribution to sustainable tourism in geoparks. Since development of local economy is a target of sustainable tourism, I attempt to ascertain the effects of creation of geoparks on sustainable tourism and local economy. Moreover, this thesis explores the effect of establishment of geoparks on participation of local communities in geotourism marketing and geopark activities. The research at international level was conducted with electronic questionnaires which were sent to all geoparks, along with the questionnaires filled by geoparks officials who participated in the 8th European Geoparks Conference, Naturtejo Geopark, Portugal 2009. As there are countries with more than one geopark such as

Japan (it has established a network of national geoparks), just one or two geoparks replied to us as a representative of all the others.

Results substantiate the importance of geoparks in employing locals in the management structure and in promoting local businesses such as geotourism marketing and production local products.

Since we selected Qeshm Geopark as a case study at local level, another questionnaire was designed for the local communities of Qeshm Geopark villages.

The literature review was an essential step to progress in the research. It focused mainly on geotourism, geoparks and the concepts related to them. The literature review (chapter 2) introduced a geopark as an area with interesting geological features or phenomena to be protected and to be used for educational, scientific, or touristic purposes. Besides, geoparks create opportunities for local economic development. It is noteworthy that in comparison with protected areas a geopark has more subtle connections with the local social and cultural life, offering a wider range of activities such as local festivals, fairs, local art workshops, conferences, and educational programs.

Since, the majority of geoparks are located in rural areas, geoparks and geotourism can be opportunities for cultural sustainability and rural development; they also try to reduce the rate of unemployment and emigration through engaging local communities in geopark activities.

Geopark authorities attempt to improve the local economy through geotourism, education, conservation activities, and innovative strategies.

Chapter 3 examined the methodology used for research study. Chapter 4, part 1 reviewed characterization of areas where the empirical study were conducted and addressed the unique geological heritage sites in each geopark as geotourism destinations. In addition, chapter 4, part 1 provided an overview of innovative strategies in geoparks.

Chapter 5, part 1 refers to the characterization of the geographical area of the Qeshm Geopark as a case study. This chapter summarized the geological, ecological, and cultural heritage sites in the Qeshm Geopark. Moreover, indicators of sustainable development for Qeshm Geopark were determined. Since, after the first revalidation a yellow card was issued for Qeshm Geopark by UNESCO, section 5.1.6 in chapter 5 focused on designing three SWOT matrices regarding better management of geosites, ecological sites and cultural and archaeological heritage sites in Qeshm Geopark.

It's worth mentioning that comments mentioned in the SWOT matrices were suggested according to experiences derived from innovation and novel strategies in other geoparks around the world registered in UNESCO Global Geoparks Network.

Chapter 4, part 2 and Chapter 5, part 2 deal with findings of the empirical study at international level (geoparks registered in UNESCO Global Geoparks Network), and at local level (Qeshm Geopark).

On the basis of the results of descriptive analyses of questionnaires, geopark authorities have taken some positive policies stimulating locals in participating in activities leading to prosperity of the local economy and preservation of natural resources:

Firstly, geopark authorities try to involve locals in conservation activities; results illustrate that the creation of a geopark in each territory engages an average of about 11 persons in geopark conservation activities in form of voluntary, supplementary income, part-time, full-time ,seasonal, and second jobs (Mean= 10.53, SD= 14.78).

Moreover, results indicate that the majority (83%) of geopark authorities believe that conservation activities improve the local economy in their territory; for instance, geoparks employ the local communities in preservation activities such as park guards, site surveillance, and projects.

Besides, results of descriptive analysis in the case study, the Qeshm Geopark, illustrate that the majority of local people (51%) believe that tourism has negative impact on the local environment; however, 54.4% of local respondents mentioned that the creation of geopark has some environmental benefits in their territory. For instance, installing rubbish bins, and signposts in villages, involving locals in conservation activities, and tourism (local guardians for preserving turtles, garbage collectors in coastal areas, local tour guides for turtle watching and plant propagation are enterprises which not only provide seasonal job opportunities and supplementary income for indigenous people but also preserve the landscapes and the environment). The above results can confirm these hypotheses (H1: Geoparks involve local communities in conservation activities, H2: Geoparks have positive socio-environmental impacts on local communities, and H7: Geoparks contribute towards increasing geological knowledge and employment of local communities in rural areas and geopark territories).

Accordingly, there is an interaction between local socioeconomic development and conservation of the natural environment of the geopark.

Aside from conservation activities, in the second strategy, geoparks – through promoting geotourism in their territory – strive to revive traditional culture and minimize the negative cultural impacts of tourism.

For sociocultural sustainable development, geoparks hold local workshops, festivals, fairs, and educational programs. Moreover, geoparks through innovative strategies try to introduce the locals' traditional skills to tourists. For example, geo-products which are made based on geological elements of the geoparks not only introduce the local products and the local handicrafts to visitors, but increase the public knowledge of visitors about geology and geomorphology. Thus, geotourism allows tourists and visitors to travel in their territory in order to get experience, learn from and enjoy earth heritage.

Based on the results of the descriptive analysis, the establishment of a geopark can be a way to promote regional food and craft businesses as cultural components in rural areas; the majority of respondents (80.0%) mentioned that the creation of geoparks can play a role in promoting local cuisine, products, and handicrafts as cultural components.

Findings also demonstrate that geoparks attempt to revive traditional food, local arts, and traditional culture through exposing them to tourists; thereby, geoparks, by promoting geotourism and innovative strategies can reduce the negative sociocultural impacts of tourism in their territory.

Responses indicate that the local people of Qeshm Geopark have positive attitudes towards tourism development in their territory, and 91.9% of respondents illustrated interest in expanding the tourist industry in their area. But they believe that there are some negative sociocultural impacts of tourism development on local communities in the Qeshm Geopark such as the demise of the local language, vanishing of local customs and traditional way of life, taking as an example the local clothes.

Apart from negative sociocultural impacts of tourism in this area, locals of the Qeshm Geopark introduced some positive socioeconomic impacts of tourism which appeared through geopark activities in this area such as regional festivals, seafood festivals, supplementary income, cultural exchange, seasonal and part-time jobs, and entrepreneurship for women. Consequently, geotourism can also contribute significantly to cultural preservation. This shows that geoparks as pioneers in geotourism development can be considered as a sustainable base for tourism development. It is evident that the results mentioned above can confirm the following hypotheses:

- H5: Geoparks contribute to promoting regional geotourism products and local products
- H6: Geoparks promote geotourism through innovative strategies
- H8: Geoparks contribute to minimizing the negative sociocultural impacts of tourism perceived by the local communities

A geopark should represent a topography (a landscape), which has a sufficient size to generate economic activities, especially through tourism. In the third strategy, geoparks encourage the local communities to participate in tourism activities; results of questionnaires illustrate that the majority (80%) of responders believe that involving the local businessmen in tourism marketing such as tours, is the best way to promote the local economy; moreover 68% of geoparks try to link their activities to other local tourism activities such as boating, bird watching, cultural activities, etc.

Besides, geoparks with a view to the development of the local economy strive to support local products and services through a label (36%) or direct marketing of regional products (36%).

48% of geoparks through creating second or seasonal jobs for the local communities attempt to generate supplementary income for them.

Engaging locals in tourism sectors such as mangrove tours, handicraft workrooms (needle work), local accommodation, and turtle sites, officials of Qeshm Geopark created second job opportunities or supplementary income for the local communities.

Developing human resources in the tourism industry faces unique challenges, because customers' preferences, travel patterns, information technology, and the conditions at destinations are changing rapidly. As a result, some strong and flexible human resources development strategies are needed. Strategies for human resources development in the tourism sector should highlight the role of the private sector, with the government acting as a catalyst to provide situations and guidelines.

In this regard, establishing a Local or National Geopark Network is the fourth strategy in geoparks. A local and/or national geopark network achieves a great partnership with business entities, libraries, student facilities, farms, camping and caravanning sites, hotels, hostels, restaurants, bars, tourism offices, NGOs, and nature tour guides. Furthermore, geoparks can train local geotour guides and local outdoor companies under the umbrella of the national geopark network.

It is evident that geopark are established at international levels but managed at local levels, the majority of geoparks (52%) are managed officially, and in the most countries geoparks (52%) are financially supported by local municipalities (H9: Geoparks do not function similarly in terms of management).

The members of the European Geopark Network and Global Geoparks Network entitled geoparks to use the logos on their promotional material. These logos must be used only on products related to geopark activities.

Subsequently, using the geopark brand in local businesses is the fifth strategy in the development of local economy and geotourism markets. Results of responses illustrate that the majority of geoparks (84%) take advantage of the geopark brand in geotourism marketing (in festivals, publications, research projects, common marketing, higher prestige, accommodation, restaurants, educational programs, and local business); moreover, some local producers use the geopark brand for their products. The aforementioned results can confirm the third and the fourth hypotheses (H3: Geotourism activities in geoparks create opportunities for local development, and H4: Using geotourism can be a useful strategy for developing tourism in geoparks).

An education program is another strategy in geoparks. A geopark can create a framework, motivation, and support to integrate research, education, and training.

Based on the results of formula related to Network analysis (Network Connection Rate (CN= 0.65) and Maximum Connectivity of the Network (MCN= 666)), Network activity in EGN is stronger than in the GGN. There are no disconnected nodes in the EGN, and all of the geoparks are involved in network activities.

The EGN and GGN have concentrated their network activity in collaboration areas of meetings, conferences, and exchange of knowledge. In addition, the authorities of geoparks attempt to develop tourism marketing in their territory as well. Therefore, the results can also confirm the tenth and the eleventh hypotheses (H10: Network activity in the EGN is stronger than in the GGN, and H11: The majority of collaboration in the GGN and EGN is concentrated in the field of exchange of knowledge and knowledge transfer).

A geopark organizes activities and provides logistic support to convey geo-scientific knowledge and environmental concepts to the public. This is accomplished through protected and interpreted geosites, museums, information centres, trails, guided tours, school class excursions, popular literature, maps, educational materials and displays, seminars, workshops, meetings and so on.

A geopark also fosters scientific research and cooperation with universities and the research institutes, stimulating the negotiation between the geosciences and the local population. Results also indicate that the majority of geoparks (72%) have been equipped with workshop facilities and 56% of geoparks authorities believe that workshops improve the local economy through involving locals, artists, geologists, etc. in workshops. Unfortunately, Qeshm Geopark is the only geopark which has a weak operation in educational programs for local schoolchildren. Qeshm has concentrated its educational activities just on geopark museums, some workshops, graduate students' theses, and publications. It is worth mentioning that recently they organized an educational program and field trips for some schoolchildren of the geopark.

The last but not the least geopark strategy is innovative activities; a new vision of geotourism and geoparks can create new products (geo-products, geo-menu in restaurants, etc.), new jobs (geotours, geo-restaurants, geo-bakeries, and rural hotels), and new recreational activities (geo-sports, geo-monuments, geosites, geopark museums, geological gardens, etc.) for local communities and visitors.

It is worth mentioning that these recreational activities that are in some way related to topography and geology are pedagogic tools for geotourists, who want to know more about the earth which they are living on.

Lastly, results of the descriptive analysis illustrate that annually an average of 7.8 million geotourists visit geoparks around the world. These numbers of geotourists in European geoparks are about average of 4.3 million per year. Obviously, the creation of a geopark and development of geotourism marketing as a branch of sustainable tourism can be a solution for local development.

Implementation of a geopark and geotourism plan in geopark territories can contribute to raising standards of living of local people who otherwise would not have access to them, especially because most geoparks are located in less favoured areas.

The geotourism 'emerging tourism' niche is still in an early stage of commercial development, and geoparks located in rural areas experience slow economic development, but we trust that in the near future geoparks will be known as new geotourism destinations for those who want to know more.

Consequently, sustainable employment at the local level may be achieved by supporting and developing small and medium sized businesses for instance those involved in tourism in the form of ecotourism and geotourism, conservation, education, gastronomy, and the production of new products such as geo-products or production and sale of local products. The development of outdoor companies, outdoor educational activities and facilities for geo-sports can generate new and sustainable jobs. The establishment of information centres in geosites, geoparks and themed museums, fairs, and exhibitions can help to generate temporary employment for designers and provide permanent employment for local people. In addition, the creation of new geopark souvenirs and handicrafts can be a means for sociocultural sustainability in rural areas and geoparks territories.

6.3. Contributions and Managerial Implications

The present study certainly benefits from previous works, especially the ones concerning geopark and geotourism concepts and current issues in innovation and novel strategies in geoparks.

Tourism marketing is diverse, and dynamic, and it can be studied at a number of levels and from many perspectives. This study focuses on the new branch of nature tourism marketing named geotourism which follows sustainability principles. This branch is a niche market with an emphasis on the ‘geo’ (geology, geomorphology, geodiversity, and geography).

In the academic sphere, this study can serve as a reference to enrich the field of tourism study named geotourism. It makes a contribution to the body of knowledge both in geography and tourism fields.

Our knowledge is pioneering in the method of comparison between geoparks and social network methods in geoparks. Moreover, this thesis tries to ascertain the novel strategies and innovation in geoparks for achieving targets of the creation of geopark (development of local economy through geotourism, education, and conservation of natural, geological, and cultural heritage).

The theoretical framework of the expansion strategy of geoparks was supported by empirical results at international level (geoparks registered in the UNESCO Global Geoparks Network) and at the local level (local communities of the Qeshm Geopark).

Findings have practical value for researchers in the tourism field especially those who are interested in new tourism destinations.

Another contribution of the thesis was introducing a new means for development of local economy and natural and cultural sustainability in rural areas.

According to the social network method in this study, the majority of collaboration in the UNESCO Global Geoparks Network concentrated on the fields of meetings, exchange of knowledge and conferences. Consequently, it can be said that at present, exchange of knowledge is an important target in UNESCO Global Geoparks Network activity. Moreover, development of tourism marketing is the fourth target of network activities in UNESCO Global Geoparks.

It is evident that in order to encourage rural development, the members of UNESCO Global Geoparks Network should pay more attention to tourism marketing in the form of ecotourism and geotourism.

Regarding development of the local economy, rural accommodations, Small and Medium-Sized Enterprises (SMEs), local companies, producers, and artists located in geoparks can benefit from a better understanding of the impact of a local network in their territory.

Consequently, this thesis contributes to the body of knowledge on introducing new tourism destinations and a new tourism product (geotourism).

6.4. Limitations and Suggestions for Future Research

6.4.1. Limitations

The research encountered some limitations that caused some difficulties in collecting the required data; firstly, since geopark and geotourism are relatively new concepts, it appears that there are a few scientific studies in this regard on which the researcher could count on.

There were some other limitations which reduced the rate of data collection. One of these was that the questionnaires were only available in three languages (English, Persian, and Portuguese). Since, in most geoparks, these languages are not the mother tongues, collecting the data took a long time for just 25 responses (from March 2009 to January 2010).

Furthermore, we not only sent the electronic questionnaires to geoparks, but also called geoparks offices several times to remind them to fill out the questionnaire and distributed the questionnaire at the 8th European Geoparks Network conference, Portugal. It is noteworthy that geoparks from China did not fill in the first questionnaires.

Aside from international questionnaires, we designed a questionnaire for local communities of Qeshm Geopark (Iran). We travelled to Qeshm Geopark during two summers (2008-2009).

The other problem was that the terms of geopark and geotourism were new terms for locals, so I had to first explain those new terms to them.

We overcame all the aforementioned limitations, and we hope that the result of this thesis opens a new gateway to introduce geoparks as a tourism destination and tools for rural development.

6.4.2. Suggestions for Future Research

Geoparks and Geotourism are new approaches of sustainability. Nowadays, the earth is faced with problems such as global warming, air pollution, acid rain, depletion of the ozone layer, loss of forests, desertification, waste disposal toxic chemicals in waters, soil erosion, mass extinction and pollution of beaches, oceans, reservoirs and waterways. Regarding this the government in each sector should try to minimize the negative impacts of economic sectors on environment.

In the tourism sector, the appearance of sustainable tourism, ecotourism, and geotourism were positive steps for preventing mass tourism and land destruction.

Geoparks – as pioneers in development of geotourism – are a novel strategy for earth preservation together with the promotion of sustainable tourism in rural areas.

The study of tourism demand, tourism demography, tourism satisfaction, evaluation of the Tourism Carrying Capacity, the Climate Index for Tourism (CIT) and Tourism Climate Index (TCI), determination of Indicators for sustainable tourism development in geoparks territory, special attention to financial slacks, policy and management, innovation, competition marketing, open marketing opportunities such as network activities and niche marketing are key issues for future tourism management in geoparks.

In the near future, pursuant to the increase of the population, different kinds of stress will be generated, and so tourists in 21st century need relaxation more than in years past. Since the majority of geoparks are located in the rural areas, geopark territories can be good tourism destinations for relaxation.

According to the information filled in on forms by geopark authorities some geoparks attempt to create some facilities for relaxation of tourists in their territory: establishing spa therapy centres in Naturtejo Geopark (Portugal), Nature park Terra.Vita (Germany), Bohemian Paradise (Czech Republic) and Itoigawa Geopark (Japan); promoting Malay herbal treatments in Langkawi Geopark (Malaysia); organizing medicinal herb tours in Eisenwurzen Geopark (Austria) and promoting geo-therapy such as mud therapy, hydro therapy, peat therapy, ice therapy, and paraffin wax therapy in Swabian Alb Geopark (Germany) are good examples in this regard.

In the 21st century the tourism sector should pay particular attention to the accessible tourism market and senior tourism market.

It is evident that seniors are retired and have more time and money for travelling. As a result, creating facilities and opportunities for the senior tourism market in geoparks can move money to geopark territories.

The accessible tourism market as niche marketing which involved disabilities, seniors and those with temporary incapacities are also part of the tourism market dynamics. Disabled visitors need new services and facilities.

The Greenwalk Company in Portugal which opened a geo-accessible tour in July 2011 with 8 blind visitors can be good example for development of accessible geotourism. Geo Accessible has been integrating four-wheel-drive (4WD) trails as well (Tavares, 2011).

Creating educational tools for disabled students and visitors can help to promote educational activities as a main target of geoparks for attracting new visitors.

Publishing Braille handbooks, tourism guidebooks for blind students and visitors, preparing video clips and organizing workshops about geoparks for deaf/mute visitors and schoolchildren with the help of the persons who are familiar with the deaf-and-dumb alphabet, training geo-tour guides for deaf/mute visitors, preparing geo-trails and exhibitions, interpretative centres for disabled and senior visitors are examples of integrating geotourism marketing with the accessible tourism market in the future through geoparks.

As mentioned before the study of tourism demand and tourism demography in each geopark territory is a prerequisite for tourism development in the future. Todd (2001) noted that the arrival numbers of visitors can be a reliable economic indicator in tourism destinations. Thus organizing some projects regarding tourism demand in geoparks is a fundamental study for the development of tourism in the future. The numbers of domestic and international visitor arrivals in each geopark, and the level of their education and expenditure, the duration of stay of visitors, tourism profile and the level of their satisfaction are key components for tourism management in geoparks territory.

Through these tourism studies, decision-making about the type of tourism facilities and services in geoparks will become easier. It is obvious that the evaluation of tourism marketing through the needs of customers enables better management of tourism destinations for governors.

For instance, if the majority of visitors in the geopark are categorized as young, geopark authorities should focus more on recreational activities such as geo-sports, adventure and fun activities (geo-rafting, climbing, geo-kayaking, etc.); and, if their education level is high officials should pay particular attention to the preparation of geotourism maps, interpretative panels, thematic museums and workshops, etc.

Another main external new trend that will strongly affect the tourism industry is climate change (Costa and Buhalis, 2006). Climate is a key component for many types of tourism, especially ecotourism and geotourism. Evaluating the Climate Index for Tourism (CIT) and Tourism Climate Index (TCI) for each geopark and preparing the TCI map for geoparks territory can be a strategy for tourism satisfaction.

According to some authors (Freitas *et al*., 2008; Farajzadeha and Matzarakis, 2009; Karimi , 2010) , weather/climate and tourism/recreation are interconnected, and tourists, tour organizers, travel agencies, tourism planners and stakeholders need to be reliably informed about the role of weather and climate.

The Tourism Climate Index (TCI) was proposed by Mieczkowski (1985), in order to use climate data for tourist destinations worldwide. This index computes the best months for travelling to a territory in the future.

It is noteworthy that these climate indexes can help to design geopark calendars and programs. For example during the months with excellent, very good and good TCI ratings, geopark authorities should organize the geotours, cruises, and some geo-sports such as rafting, organizing tours for seniors, etc. and during the good and acceptable TCI periods, officials can concentrate on educational activities in universities, schools, kindergartens, museums and interpretive centres.

Freitas *et al*. (2008) illustrated that evaluation of the rates of Climate Index for Tourism (CIT) can play an important role in activities that are highly climate/weather sensitive, specifically, beach “sun, sea and sand”.

Therefore, computing this parameter can be a useful strategy for the development of tourism in geoparks located in coastal areas and that are members of the coastal thematic group (e.g. Shetland, Petrified Forest of Lesvos, Gea-Norvegica, Copper Coast, Geo Mon, and English Riviera geoparks).

Since conservation is one of the targets for geoparks, determining Tourism Carrying Capacity in geopark territories is an important factor in the preservation of natural heritage and development of sustainable tourism. Tourism Carrying Capacity is defined by the World Tourism Organization as “The maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic, sociocultural environment and an unacceptable decrease in the quality of visitors' satisfaction”.

In addition to Tourism Carrying Capacity, sustainable development indicators can lead to better decisions and more effective actions by simplifying, clarifying, and making aggregated information available to policy makers (United Nations, 2007). Determining sustainable development indicators can help to integrate social science and physical knowledge into decision-making; they can also be important components to measure progress towards sustainable development goals. They can provide an early warning to prevent negative economic, social, and environmental impacts. These indicators are important for implementation of tourism management planning.

It is worth mentioning that in geopark management authorities should pay particular attention to sustainable tourism principles as well. In view of the fact that the tourists in the 21st century are different from the past, they want to gain more experiences from travel and sightseeing together with the experience of unique facilities and attractions. In recent decades, the numbers of educated tourists have increased, so they need a new leisure market, niche products and services. Creating this kind of products requires searching about the scope of the local economy, professionalism and innovation. New markets require different products and services, thus innovation and innovative strategies can play a role in promoting new markets.

Nowadays, geoparks as open museums for the development of geotourism strive to offer new geotourism facilities to visitors. Since geotravelers are interested in knowing more about the earth where they live, geotourism as niche marketing, which emphasizes the ‘geo’ (geology, geomorphology, geodiversity, and geography) should pay particular attention to educational activities, and should try to achieve educational goals through recreational activities. Geoparks, as pioneers for the development of geotourism, for creating geo-products and geo-services as leisure and pedagogic tools need innovation and professionals in geology, geomorphology and geography. Moreover, the establishment of geo-restaurants, geo-museums, preparation facilities for geo-sports and organization of geotours demonstrate that geopark authorities are searching for a new leisure market and are trying to combine the earth sciences with recreational activities in geopark territories.

Nevertheless, study of geoparks and geotourism is classified in interdisciplinary sciences as well as tourism marketing, so collaboration and network activities between specialists in related sciences such as geology, geography, ecology, tourism, biology, agriculture, environment, etc., can be a useful strategy for better management of geoparks in the present and future.

Perhaps the most important element in the future of geotourism is innovation and competition. Geoparks as messengers of geotourism should strengthen their competitiveness activities. At local level geoparks can hold thematic competitions for schoolchildren and local communities (e.g. painting, sand festivals, making thematic cakes, taking photographs, and producing geo-products). However, at an international level competition should concentrate on international projects.

Regarding this, National Geographic held a global competition entitled “Geotourism Challenge 2010: Places on the Edge – Saving Coastal & Freshwater Destinations”. Entrants can submit their ideas and proposals in the competition. This kind of competition is not only a strategy for collecting innovative ideas and brainstorms, but also the winner’s prize can cover some part of the necessary financial budget for implementation of projects.

Geotourism and geoparks should pay more attention to applying new technology in the 21st century. As geopark and geotourism are new terms and they are still in an early stage of development, so virtual tours which are provided by the Geographic Information System (GIS), improving interactivity of geopark websites, expanding local TV channels, and Geopark online TV channels can play an important role in tourist attraction to these territories. Therefore, expanding multimedia guides and self-guiding tours for geotourism such as TERRAGAZE mobile and geological multimedia kiosk in each geopark are other areas for further research.

Establishment of thematic museums in geoparks, in accordance with the geological and geomorphological phenomena in each geopark can be strategic to educate visitors. Mineral galleries and geothermal interpretive centres (in European Geoparks), desert (in

Middle East or African Geoparks), or petroleum museums (in Middle East Geoparks) are examples in this regard. Thus, the thematic study of geoparks, thematic networks and geo-museums are other subjects of future researches.

According to methodology, in this thesis the Social Network Analysis (SNA) method was used for visualizing UNESCO Global Geoparks Network and European Geoparks Network to ascertain the fields of their collaboration. Hence, it can be said that the use of Social Network Analysis (SNA) method in each geopark for better understanding of the impact of local networks on rural development is another area for future research.

The last but not the least suggestion for future research is focusing on sustainable energy and geo-energy (coal, petroleum and geothermal, nuclear energy). Holding workshops on geo-energy in related geoparks and providing infrastructures and facilities for the establishment of eco-campsites and geo-campsites in geopark territories can help to develop sustainable tourism.

Using the renewable resource of geothermal energy for cooling and heating of geo-campsites and eco-campsites in geopark territories in the near future can be a positive step toward sustainable development and sustainable tourism.

Figure 6.1 illustrates the topics for research in geotourism. Furthermore, future issues in geopark research are summarized in Figure 6.2.

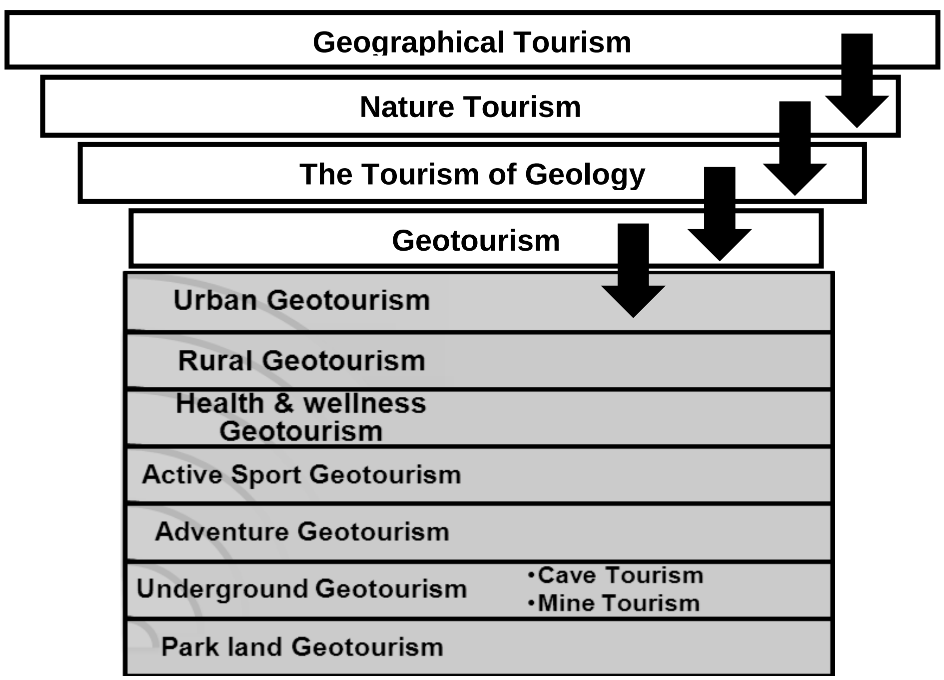


Figure 6.1- The topics for research in geotourism

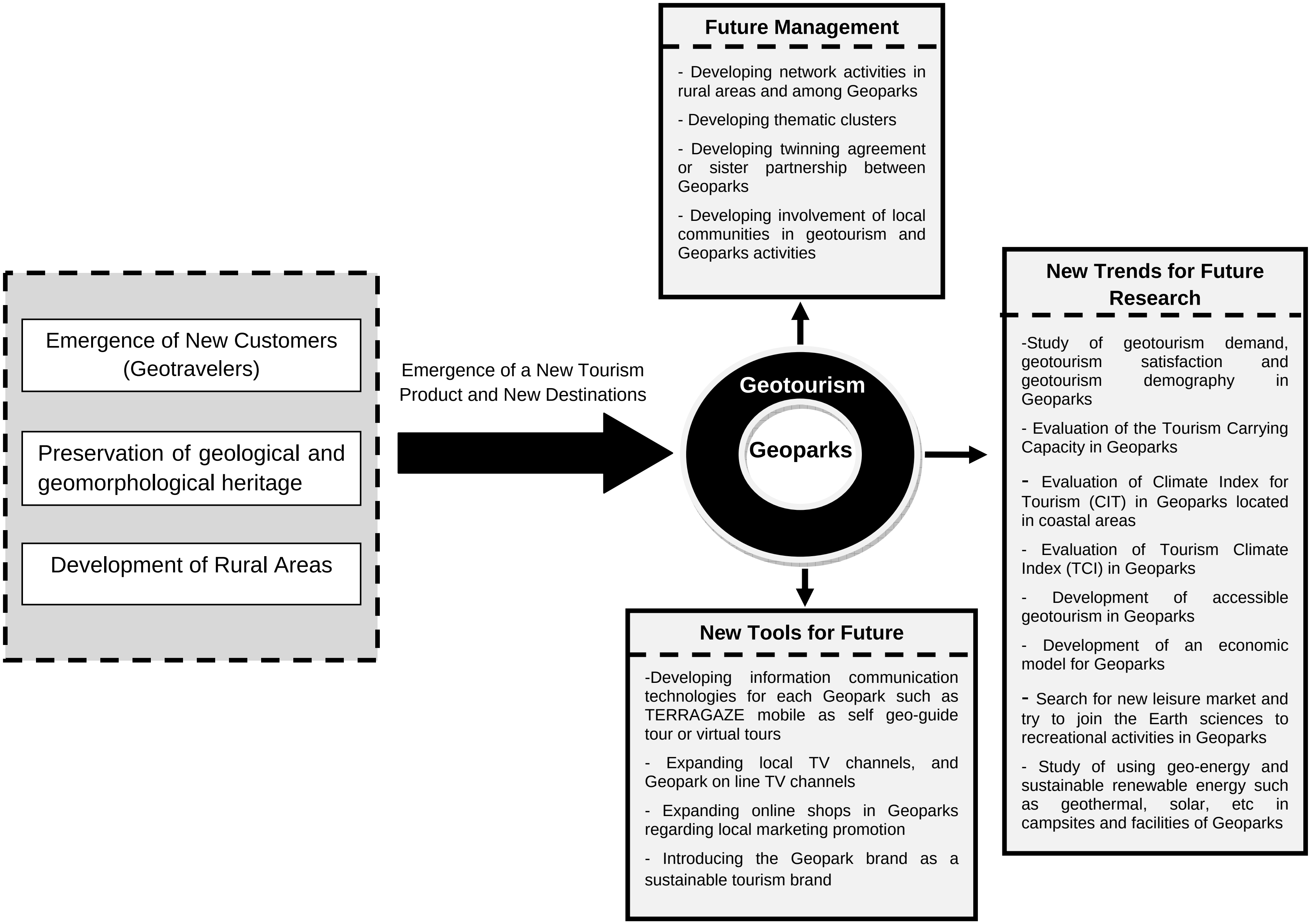


Figure 6.2- Future issues in geoparks research

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Appendix 1- Questionnaire administrated in order to investigate the role played by geoparks registered in UNESCO Global Geoparks Network in rural development

universidade de aveiro	This Questionnaire is a part of a research programme of a PhD student at the University of Aveiro (Portugal). The aim of the study is to find out the effects of geopark creation on geotourism and the local economy – your participation is essential for its successful conclusion! We would appreciate it very much if you could take some minutes of your time to answer the following questions.

Geoparks and local communities

Geopark name:	
Region:	
Country:	
Geopark area (Km2)	
Telephone:	
Fax:	
Email:	
Date of Creation	

Management Structure

1. What is the management structure of geoparks in your country?

☐ Public administration
☐ Private administration
☐ Public /Private administration

2. Which organizations financially support geoparks in your country?

☐ Municipality (How many)
☐ Environment department
☐ Tourism department
☐ Other…………………………………………………….

3. Does the geopark cooperate with other organizations and companies?
Yes ☐ No☐
If yes please state which organizations and companies.

Board of directors

4. How many employees work in the geopark (full time/ part time) and who pays them?

5. How many employees of the geopark are locals?

Local communities and local economy

6. Does the geopark have a brand and logo of its own?

Yes ☐ No ☐

7. Do geotourism markets take any advantage of the geopark brand?
   Yes ☐ No ☐

   If yes, how?

8. Does brand play a role in the development of the local economy?

   Yes ☐ No ☐

   If yes, how?

9. Does the geopark promote regional food and craft products?

   Yes ☐ No ☐

   If yes, please go to question 11.If no, go to question 12

10. What efforts are undertaken to create and promote regional geotourism products of the geopark?

☐ Meals from regional and/or ecological products are available in restaurants

☐ The applicant organizes markets where mainly regional agricultural products are sold

☐ A label for regional food products or local gastronomy exists

☐ Casts and souvenirs shop from local products are available in the geopark

☐ Local foods are served on tours

☐ There are some initiatives in promoting foods from regional and / or ecological / or geotourism products, which are developed or actively supported by the geopark. (Could you please explain about your innovative activities?)

11. What efforts are undertaken to promote links between the geopark and the local economy?

☐ A label given to the regional services/products has increased the number of partnerships

☐ Direct marketing of regional products is undertaken by your organization

☐ Tourism offers include tours of collaboration with local businesses

☐ Links with other local activities (boating, bird watching, cultural activities, etc.)

12. Does your geopark create second jobs or seasonal jobs for local communities?

    Yes ☐ No ☐

    If yes, what jobs and how many?

Local communities and conservation

13. What are the conservation activities in the geopark?

14. How many people are involved in conservation activities?

15. Does conservation of the geopark improve the local economy?

    Yes ☐ No ☐

    If yes, how?

Local communities and tourism

16. Does the geopark have close collaboration with the tourism sector?

    Yes ☐ No ☐

    If yes, how?

17. Are Visitors beneficial to local businesses in your geopark? Yes ☐ No ☐

☐ By entrance tickets
☐ By participants on geopark tours
☐ By buying souvenirs
☐ By participants in workshops and conferences
☐ Other (please state which?)…………………………………….

18. Do you count visitors? Yes ☐ No ☐

    If yes, how many visitors usually visit the geopark (per year)?

    How many of them are foreign or domestic?

    How many days do they usually stay in the geopark?

19. Does your geopark engage locals as guides, park guards, or others?

    Yes ☐ No ☐

    How many of them usually participate?

20. Are local people stakeholders in the tourism sector?

    Yes ☐ No ☐

    How?

21. Does the geopark have workshop facilities?

    Yes ☐ No ☐

    What workshops?

22. Are the workshops managed by locals?

    Yes ☐ No ☐

23. Do the workshops improve the local economy?

    Yes ☐ No ☐

Please write below any other **innovative strategies** in the geopark which improve local communities

Thank you very much for your collaboration!

Appendix 2- Questionnaire administered in order to investigate the network activity between Geoparks registered in UNESCO Global Geoparks Network

Geopark Name…………………

With which geoparks does your geopark collaborate? And in which area?

☐ **Kanawinka Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Nature Park Eisenwurzen**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Araripe Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Papuk Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Bohemian Paradise Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Park Naturel Régional du Luberon**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Geopark Bergstrasse - Odenwald**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Geopark Harz Braunschweiger Land Ostfalen**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Geopark Swabian Albs**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings
☐ Other

☐ **Nature park Terra Vita**
☐ Tourism Marketing

☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Vulkaneifel Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Chelmos-Vouraikos Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Petrified Forest of Lesvos**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Psiloritis Natural Park**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Novohrad-Nograd geopark**
☐Tourism Marketing

☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Qeshm**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Rocca Di Cerere Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Adamello Brenta Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Parco del Beigua**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Madonie Natural Park**
☐Tourism Marketing

☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Geological and Mining Park of Sardinia**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Toya Caldera and Usu Volcano Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Itoigawa Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Unzen Volcanic**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Langkawi Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Gea-Norvegica Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Magma Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Arouca Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Naturtejo Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production New Products
☐Exchange Knowledge
☐Conference
☐Meeting
☐Other

☐ **Copper Coast Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Hateg Country Dinosaur Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Cabo de Gata Natural Park**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Maestrazgo Cultural Park**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Sobrarbe Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Subeticas Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Shetland Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Geo Mon Geopark**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Forest Fawr Geopark – Wales**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production New Products
☐ Exchange Knowledge
☐ Conference
☐ Meeting
☐ Other

☐ **Marble Arch Caves & Cuilcagh Mountain Park**
☐ Tourism Marketing
☐ Educational Activities
☐ Conservation Programs
☐ Production of New Products
☐ Exchange of Knowledge
☐ Conferences
☐ Meetings

☐Other

☐**North Pennines AONB Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**North West Highlands – Scotland**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Lochaber Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**English Riviera Geopark**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

☐**Geopark in China (please mention the name of the geopark)**
☐Tourism Marketing
☐Educational Activities
☐Conservation Programs
☐Production of New Products
☐Exchange of Knowledge
☐Conferences
☐Meetings
☐Other

Thanks a lot for your collaboration

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Appendix 3- Questionnaire administered in the surrounding villages of Qeshm Geopark in order to investigate the role played by Geoparks in rural development

universidade de aveiro	This Questionnaire is a part of a research programme of a PhD student at the University of Aveiro (Portugal). The aim of the study is to find out the effects of economic activities on geoparks and the attraction of sustainable tourism to geoparks – your participation is essential for its successful conclusion! We would appreciate it very much if you could take some minutes of your time to answer the following questions.

characterization of interviewee

1. Place of residence …………………………..
2. Sex:
   Male ☐ Female ☐
3. Age:
   0-16 ☐ 16-32 ☐ 32-48 ☐ 48-64 ☐ 64-80 ☐
4. Education level:
   Read and write ☐ Primary school ☐ Guidance school ☐ High school ☐
   University ☐
   Graduation……………………………………..
5. Activities:
   Industry ☐ Agriculture, Fishing and Forestry ☐ Tourism ☐ Education ☐
   Specialty ……………………………………...

Local communities and Qeshm Island Geopark

1. Does the local community depend on a single industry?
   Yes ☐ No☐ I don't know / no answer ☐

   What?
2. Are there unemployed people in the local community?
   Yes ☐ No☐ I don't know / no answer ☐
3. Is the level of unemployment seasonal?
   Yes ☐ No☐ I don't know / no answer ☐
4. Do you think that geotourism has a positive impact on the local economy?

   Yes ☐ No☐ I don't know / no answer ☐
5. Would you like to see an expansion of the tourist industry in your area?
   Yes ☐ No☐ I don't know / no answer ☐
6. Do you think that tourism has negative impact on the town/village socially?
   Yes ☐ No☐ I don't know / no answer ☐

   In what way?
7. Do you think that tourism has negative impact on the local environment?
   Yes ☐ No☐ I don't know / no answer ☐

   In what way?

8. Are there any community based conservation approaches being applied to your area to encourage protection of the natural area?
   Yes ☐ No☐ I don't know / no answer ☐

   If yes, please name

9. Do you know what a geopark is?
   Yes ☐ No☐ I don't know / no answer ☐

10. Do you know that Qeshm is a geopark?
    Yes ☐ No☐ I don't know / no answer ☐

11. Are there any environmental benefits resulting from a geopark in your area?
    Yes ☐ No☐ I don't know / no answer ☐

    If yes, please name

12. Are there any socio-economic benefits resulting from a geopark in your area?
    Yes ☐ No☐ I don't know / no answer ☐

    If yes, please name

13. Are you employed in the geopark?
    Yes ☐ No☐ I don't know / no answer ☐

How many people? ....
Full time: ………………. %
Part time: ………………%
Seasonal job: …………. %

How much is your salary?

☐ 50-100
☐ 100-150
☐ 150-200
☐ 200-250
☐ >250

Please write below any comment you would like to make.

Thank you very much for your collaboration!

Appendix 4- Geo Pizza in Casa do Forno, Naturtejo Geopark, Portugal (Source: photo l Geraldes. J)

Appendix 5- Geo- restaurant, Naturtejo Geopark, Portugal (Source: photo by : Rodrigues, J. and Neto de Carvalho, C.)

Appendix 6- S. Torcato-Moradal guest house, Naturtejo Geopark, Portugal (Source: photo by: Farsani, T.N)

Appendix 7- Educational program in Arouca Geopark, Portugal (Source: Programas educativos, 2008/2009)

Appendix 8- Fossil museum, Arouca Geopark, Portugal (Source: http://www.cigcarouca .com/galeria.html)

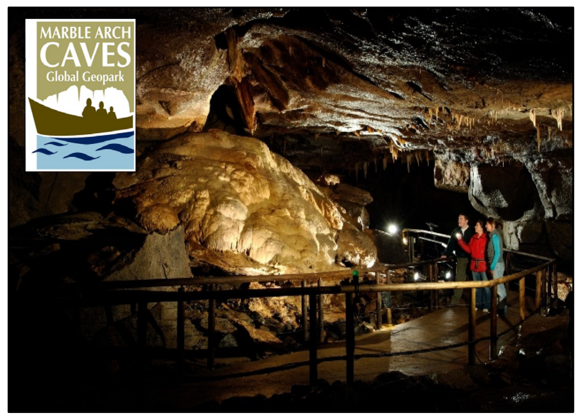
Appendix 9-Trilobite clock as a decorative geo-product, Arouca Geopark, Portugal (Source: photo by: Farsani, T.N)

Appendix 10- Pedras Parideiras as a geo-product, Arouca Geopark, Portugal (Source: photo by : Farsani, T.N)

Appendix 11- Visitors view dinosaur footprints at Terra Vita in Germany (Source: http://www.scottishgeology.com/outandabout/geoparks/nw _highlands_clip_image010.jpg)

Appendix 12 - The geological features and Goslaren Museum in Harz Geopark (Source: http://www.globalgeopark.org/publish /portal1/tab133/info285_page2.htm)

Appendix 13- Dinosaur footprint in Maestrazgo Geopark (Source: http://www.spain.info/US/TourSpain/Reportajes/0/El+Parque+Jurasico+de+Europa.htm?SubSys=TParks?language=EN)



Appendix 14- Marble Arch Caves, North Ireland, (Source: http://www.marblearchcaves.net/)

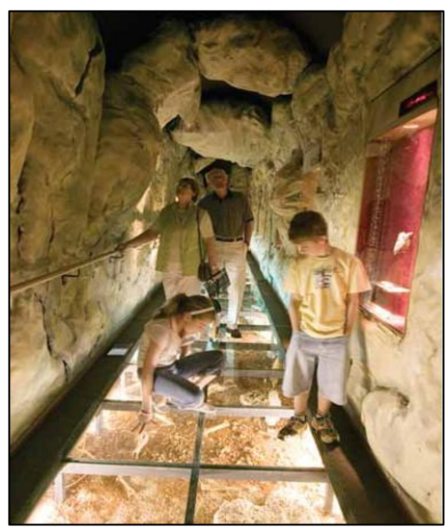
Appendix 15- Mountain bike shop and tourism information in Adamello Brenta Nature park, Italy (Source: http://www.girovagandointrentino.it/puntate/2009/primavera/parcoadamellobrenta/parcoadamellobrenta.htm)

Appendix 16- Water Park of St. Gallen in Eisenwurzen Geopark, Austria (Source: http://www.quax.at/freizeit/fun_action/ wasserspielpark_eisenwurzen?seite=galerie)

Appendix 17- Georafting in Eisenwurzen Geopark, Austria (Source: http://www.quax.at/freizeit/fun_action/wasserspielpark_eisenwurzen?seite=galerie)

Appendix 18- An educational site for students and teachers in Gea Norvegica Geopark, Norway (Source: http://www.geanor.no/ger/Education)

Appendix 19- Decorative geo-products in Papuk Geopark, Croatia (Source: Papuk Geopark web site)



Appendix 20- Walking cave tour, Kanawinka Geopark , Australia (Source: http://www.mountga mbiertourism.

Appendix 21- Kilim Karst Geoforest Park in Langkawi Geopark, Malaysia (Source: http: //www.flickr.com/photos/wazari/3617034 796/in/photostream/)

Appendix 22- Rice planning and educational program for schoolchildren in Itoigawa geopark, Japan (Source: http://web.me.com/mac314/IGP -E/suishinshitsu-e.html)

Appendix 23-Educational program for schoolchildren in Araripe Geopark, Brazil (Source: photo by: César Boggiani, P)

Appendix 24- Stars valley field visit, Qeshm Geopark, Iran (Source: Photo by Ahmad Bazmandegan Qeshmi)

Appendix 25- Chahkooh valley, Qeshm Geopark, Iran, (Source: photo by Farsani, T.N)

Appendix 26-Three Namakdan salt cave, Qeshm Geopark, Iran (Source: http://www.speleogenesis .info/mg/spotlight/3n_cave/004_the-OctopusI.jpg)

Appendix 27- Erosion features, Qeshm Geopark, Iran (Source: Photo by Farsani, T.N)

Appendix 28- Hawksbill turtles conservation activities in Qeshm Geopark, Iran (Source: http://www.tabnak.ir/fa/pages/?cid=2038)

Appendix 29- Wind towers in Loft village, Qeshm Island, Iran, (Source: Fars News photo by Noroozi, E.)

Appendix 30 – Talla wells, Qeshm Geopark, Iran, (Source: http://www.qeshmecotourism.com/pages .php?id=25.)

Appendix 31 - Turtle and dolphin puzzles as educational tools for schoolchildren and kids in Qeshm Geopark, Iran

Appendix 32 - Turtle biscuit as an eco-product in Qeshm Geopark, Shibderaz village

Appendix 33 - Turtle Sabzeh during the Nowruz holiday, integrating Iranian culture with the symbol of Qeshm Geopark, Shibderaz village

Appendix 34 - Handicrafts which are symbols of Arouca Geopark (Portugal) (Source: Arouca Geopark)

Appendix 35 - Old mine wagon as a winner of Geopark themed cake competition in 2009, (Source: Copper Coast European Geopark)

Appendix 36 - Ammonite bread, baked locally in the town of Barrême, (Source: Jean-Simon PAGÈS)

Appendix 37- Trilobite cakes, baked locally in the Casa do Forno, Naturtejo Geopark, Portugal

Appendix 38 - Trilobite swimming board in Naturtejo Geopark, Portugal, (Source: Monthly report of geopark, No 37)

Appendix 39 - TERRAGAZE mobile as a geological tour guide, (Source: http://www.terragaze.com/cycling.html)

Appendix 40- Difference in culture between domestic tourists and local people of Qeshm Geopark

Appendix 41-Qeshm Geopark Calendar

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Jan																														
Feb																														
Mar	[1]Turtles Nesting					Afforestation Day															Qeshm Geopark anniversary									
Apr		The day of Nature																	Renewal of Qeshm geopark by UNESCO			Earth Day								Day of Persian Gulf
May								International Migratory Bird Day																				[2]Geopark week		
Jun										Handicrafts Day							World Day to Combat Desertification				World Music Day And Folk Music Festival in Qeshm									
Jul					[3]Summer festival																Norouz Sayyad Festival									
Aug						Palm and Date Festival																								
Sep																											World Tourism Day			
Oct		Shrimp Festival										Natural Hazard (earthquake maneuver)																		
Nov																														
Dec																														

Designer: Neda Torabi Farsani

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[1] 1st March to 5th June
[2] 28th May to 8th June
[3] 5th July to 21st August